ETIOLOGIES, RISK FACTORS AND OUTCOME IN HOSPITALIZED PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA

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I hereby declare that the thesis entitled "**ETIOLOGIES, RISK FACTORS AND OUTCOME IN HOSPITALIZED PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA**" submitted towards partial fulfillment of the requirements for the award of **MD in General Medicine** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Rajesh Mahajan**, Professor, Department of Medicine, **Dr. Akashdeep Singh**, Professor & Head, Department of Pulmonary Medicine and **Dr. Veenu Gupta**, Professor & Head, Department of Microbiology. No part of this thesis has formed the basis for the award of any degree previously.

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Dedicated

to

my Family,

friends

&

Teachers

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DR HARMANPREET SINGH BATRA

ABBREVIATIONS

AIDS:	Acquired immunodeficiency syndrome
APACHE:	Acute Physiology and Chronic Health Evaluation
ARDS:	Acute respiratory distress syndrome
ATS:	American Thoracic Society
CABP:	Community-acquired bacterial pneumonia
CAD:	Coronary artery disease
CAP:	Community-acquired pneumonia
CAPO:	Community-Acquired Pneumonia Organization
CDC:	Centers for Disease Control and Prevention
CKD:	Chronic kidney disease
CNS:	Central nervous system
COPD:	Chronic obstructive pulmonary disease
COPD:	Chronic obstructive pulmonary disease
COVID-19:	Coronavirus disease-19
CPG:	Clinical practice guidelines
CT:	Computed tomography
CURB-65:	Confusion, uremia, respiratory rate, BP, age > 65 years
CVS:	Cardiovascular system
DIC:	Disseminated intravascular coagulation
DM:	Diabetes mellitus
ED:	Emergency department
ERS:	European Respiratory Society
GIT:	Gastrointestinal tract
GNB:	Gram-negative bacteria
HAP:	Hospital-acquired pneumonia
HIV:	Human immunodeficiency virus
ICU:	Intensive care unit
IDSA:	Infectious Diseases Society of America
Ig:	Immunoglobulin
LFT:	Liver functional tests
LRTI:	Lower respiratory tract infection

MI:	Myocardial infarction
MRSA:	Methicillin-resistant Staphylococcus aureus
OR:	Odd ratio
PCR:	Polymerization chain reaction
PORT:	Pneumonia Patient Outcomes Research Team
PSI:	Pneumonia Severity Index
SARS-CoV-2	Severe acute respiratory syndrome coronavirus 2
SCAP:	Severe Community-acquired pneumonia
SD:	Standard deviation
VAP:	Ventilator-acquired pneumonia
WHO:	World health organization

ABSTRACT

BACKGROUND: Community-acquired pneumonia (CAP) remains an important cause of morbidity and mortality in industrialized countries. The need to estimate regional incidence and prevalence of the disease with its diverse etiology is justified by the shifting patterns and rising incidence of CAP. Thus, the present study was conducted to determine the etiology, risk factors and outcome in hospitalized patients with community acquired pneumonia at our institute.

MATERIALS & METHODS: 300 patients with presumed pneumonia; presenting with symptoms of acute respiratory infection in the emergency department, medicine ward and intensive care unit(ICU).A thorough demographic history and clinical history were obtained in the pre-designed study proforma. The clinical examination was done at the time of presentation and investigations which are part of evaluation like hemogram, metabolic profile, chest X-ray, radio-imaging, etc. was done. Outcome of the patient was assessed at the time of discharge.

RESULTS: Mean age of the patients was 52.85 years. Among 78 percent of the patients, the etiology was COVID 19. In 10 percent of the patients, CAP was of bacteriological etiology (Klebsiella) while 2.67 percent of the patients with CAP had viral etiology (Influenza A H1N1). Tuberculous etiology was seen in 5 percent of the patients while etiology was unknown in 4 percent of the patients. Overall, mortality was seen in 51 percent of the patients. Pulmonary complications were seen in 91.33 percent of the patients. CVS complications were seen in 70.67 percent of the patients. GIT complications were seen in 36 percent of the patients. Among haematological complications, coagulopathy was seen in 17.67 percent of the patients. Mortality rate among patients with COVID-19 etiology was significant higher (60.25 percent) in comparison to patients with other etiologies. Mortality rate was 60.25 percent among patients with COVID-19 etiology while it was 18.2 percent among patients with non-COVID etiology. On comparing the results were found to be significant statistically.

CONCLUSION: Long recognised as a major cause of death, CAP has been studied intensively since decades ago, the result of which led to many formative insights in modern microbiology, despite this research and the development of anti-microbial agents, pneumonia remains a major cause of complications and death.

KEYWORDS: Community-acquired pneumonia, Complications, Covid-19, Etiology, risk factors, outcome.

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INTRODUCTION

The primary job of the lungs, which are the building blocks of the respiratory system, is to enable gas exchange between the environment and the blood. The alveoli carry oxygen to the capillary network, where it can enter the arterial system and eventually perfuse tissue. The nose, oropharynx, larynx, trachea, bronchi, bronchioles, and lungs make up most of the respiratory system. Over three hundred million alveoli are separated into individual lobes, which are then further divided into individual lobes. The main site of gas exchange is in the alveoli.[1]

In the developing world, pulmonary pathologies are a significant cause of morbidity and mortality and, in relation to chronic respiratory diseases in particular, are a source of growing concern. Despite the enhanced efficacy of treatment and preventive measures, tuberculosis has long been the major cause of adult respiratory disease mortality and kills many more people than it should. Other acute and chronic adult respiratory disorders, however, are becoming more prevalent globally. These conditions can be divided into four groups: parenchymal lung diseases, such as immune-related lung diseases, occupational lung diseases, such as byssinosis, asbestosis, and coal worker's pneumoconiosis; acute diseases, such as pneumonia and influenza; chronic diseases, such as COPD and asthma; occupational lung diseases.[2]

An infection of the lung that typically affects the alveolar space is referred to as pneumonia. Without an associated inflammatory reaction, the presence of micro-organisms in the alveolar space is referred to as colonisation rather than pneumonia. A range of other types of infection may also affect the lung and can be classified according to their principal site of infection.[3]

Pneumonia is further categorised in a number of ways. These are mostly clinical classifications that generally represent variations in the range of potentially implicated micro-organisms. The most typical classification is made based on the patient's location at the time of

infection. Compared to infections that develop in the community, infections that develop in a hospital setting may have a greater number of micro-organisms that are drug-resistant. If the patient was in an intensive care unit or intubated (ventilator-acquired pneumonia, or VAP), additional distinctions are typically established under the category of hospital-acquired pneumonia (HAP).[3]

On the basis of location, it is classified into community acquired pneumonia, hospital-acquired pneumonia as well as ventilator-acquired pneumonia. In community acquired pneumonia, the infection is acquired in the community. When the infection is acquired after a hospital stay of over 48 hours or when someone gets recently discharged from the hospital and gets infected within 7 days of discharge, it is called hospital acquired pneumonia. And when it is acquired by a patient admitted to the ICU who is mechanically ventilated for over 48 hours, it is called ventilator-acquired pneumonia. Based on the immune patient's immune status, it is classified into immunocompetent and immunocompromised. When an individual shows no immune dysfunction, he/she is said to be immunocompetent. Whereas when one shows signs and symptoms of immune dysfunction, that individual is known to be immunocompromised. On the basis of microbiology, it is classified into viral, bacterial, fungal, mycobacterial and parasitic. This classification relies upon basic microbiology which is usually unavailable at the time of the first presentation, and may remain elusive even after investigation.[3]

In the occurrence and treatment of pneumonia, host variables are crucial. Typically, pneumonia that develops in immunosuppressed hosts requires special care. The range of possible infections is typically bigger the more immunological impairment there is. The clinical presentation may change if the typical signs of infection, which are partially correlated with the host immune response, are absent.[3]

Community-acquired pneumonia (CAP) remains an important cause of morbidity and mortality in industrialized countries. In the general adult population, the annual incidence of CAP ranges between 1.6 and 13.4 cases per 1,000 inhabitants, 22-51% of whom require inpatient care,

with lethality of 3-24%. The mortality rate varies between 0.1 and 0.7 per 1,000 persons each year.[4]

US Centres for Disease Control and Prevention (CDC) carried out a study which aimed at estimating its burden in North America and it found that CAP accounted for the eighth-leading cause of mortality in the United States and the seventh-leading cause of mortality in Canada after adjusting for various gender and age differences. According to one study, the yearly age-adjusted incidence of CAP was 649 patients hospitalised per 1 lakh adults in Louisville, which correlates to 1,591,825 annual adult CAP hospitalization in the United States. Louisville had a population of 587,499 adults between 2014 and 2016. In addition, the study discovered that hospital mortality was 6.5%, corresponding to 102,821 fatalities annually in the US. At 30 days, 6 months, and 1 year after the study's start, mortality was 13.0%, 23.4%, and 30.6%, respectively. Community-Acquired Pneumonia Organization (CAPO) database formulated based on incidence in 16 countries clustered in 3 distinct areas, namely the United States/Canada, Europe, and Latin America found that the mortality rates in these regions were 7.3%, 9.1%, and 13.3% respectively.[5-7]

According to a study from Mumbai, Streptococcus pneumoniae and Gram-negative bacteria (Pseudomonas aeruginosa and Klebsiella pneumoniae) were more common in severe pneumonia, which affected 19% of all patients. The significance of pneumococci in the invasive pneumococcal infections in India is highlighted by a recent review. Between 14 to 30% of reported case fatalities in all CAP patients and 47% in SCAP patients.[8, 9]

Different tropical Asian countries' CABP etiologies present diagnostic and therapeutic issues. Despite the fact that S. pneumoniae was identified as the most typical CAP aetiology in two comprehensive investigations, regional and national differences do exist. More than 10% of CAP cases in Asia were linked to Mycobacterium tuberculosis in a comprehensive review. Numerous fever syndromes in the tropics are initially diagnosed as CAP due to the similarities between the symptoms of pneumonia and acute respiratory distress syndrome

(ARDS). Among others, scrub typhus, leptospirosis, malaria, and dengue are significant deterrents in the early detection of CAP.[10-12]

Since late 2019, the microbial aetiology of CAP has shifted dramatically with the emergence of SARS-CoV-2, the virus that causes COVID-19. More than 350 million infections and 5 million deaths related to COVID-19 have been reported, whereas the incidence of non-COVID-19 pneumonia strongly decreased, in part due to preventative societal measures.[13, 14]

Unfortunately, the classic microbiological diagnostic tests for CAP, sputum and blood cultures, fail to reveal a definitive pathogen in many cases (3), and although the identification of a specific pathogen can help narrow treatment decisions, the delay in obtaining a result leads to the need for initial empirical coverage, which is active against the common bacterial pathogens.[15, 16]

Recent studies have shown that indications of pulmonary involvement on chest imaging, such as lobar consolidation, ground glass opacities, and reticular infiltrates, are frequent in patients with confirmed COVID-19. According to one study, 86% of hospitalised patients had abnormal chest computed tomography results and 59% of them had initial chest radiography abnormalities that are consistent with pneumonia. The majority of these patients with radiographic anomalies presumably have isolated severe acute respiratory syndrome coronavirus- 2 infection in the lung without any other pathogen, according to a highly untested hypothesis. A recent case study, however, found that fatal COVID-19 pneumonia cases frequently included serological evidence of co-infection with bacterial infections, including chlamydia.[15, 16]

Outcome of hospitalized patients are dependent on the following: length of the hospital stay, in-house mortality, ICU admission, requirement of mechanical ventilation, early/late treatment failure, and complications. Complications are pulmonary (respiratory failure, pulmonary embolism); CVS (shock, CHF, MI, arrhythmia); GIT (bleeding, vomiting, diarrhoea, LFT dysfunction); and haematological dysfunction (DIC or coagulopathy).[15, 16]

The need to estimate regional incidence and prevalence of the disease with its diverse aetiology is justified by the shifting patterns and rising incidence of CAP. Furthermore, the clinical makeup of individuals who arrive with CAP is so diverse that it necessitates a wide range of investigative set-up and resources in order to care for them holistically. The abuse of oral and intravenous antibiotics as a result of the delay in culture reports has caused the emergence of antibiotic resistance. Every institute must therefore have an etiological profile of organisms with their culture sensitivity in order to help with the initial administration of antibiotics.[15, 16]

Thus, the present study was conducted to determine the etiology and clinical profile of patients presenting with community acquired pneumonia at our institute. The knowledge of the baseline demographic and clinical profile of the patients shall help in knowing the various risk factors and its implication on the outcome.

AIMS AND OBJECTIVES

To determine the etiology, risk factors and outcome in hospitalized patients in community-acquired pneumonia.

REVIEW OF LITERATURE

DEFINITION

An infection of the lung parenchyma is referred to as pneumonia, and it can result from either infectious or non-infectious causes. Another way to describe pneumonia is as a lung infection that usually affects the alveolar space. Without an associated inflammatory reaction, the presence of microorganisms in the alveolar space is referred to as colonization rather than pneumonia. The lung may also be impacted by a variety of different infections, which can be categorized based on the primary source of infection. In the emergency room (ED), pneumonia is a respiratory infection that is frequently seen and causes significant morbidity and mortality in our patients. Community-acquired pneumonia (CAP) is defined as an acute lung infection involving the alveoli that develops in a patient who hasn't recently been exposed to medical care is known. The clinical range of CAP includes conditions like walking pneumonia in otherwise healthy people and necrotizing or multilobar diseases with septic shock.[17-20]

EPIDEMIOLOGY

Pneumonia is the sixth leading cause of death in United States. The death rate per 100,000 patients was 21.8. In 2009, according to the centers for disease control and prevention, 1.1 million people were hospitalized, among more than 50,000 who died from pneumonia[1].In spite of having total number of deaths due to lower respiratory tract infections available, there is no systemic study conducted on incidence of pneumonia in India. According to World Health Organization, in India mortality due to infectious disease is caused by lower respiratory tract infections is around 20%.[17- 20]

Data on the epidemiology of pneumonia are drawn from two broad sources—(a) datasets that rely on the coding of pneumonia following clinical episodes, and (b) cohort studies of patients with radiology-confirmed pneumonia. Incidence The Global Burden of Disease study

estimated that in 2015, the incidence of LRTI in children aged < 5 years old was 0.15 episodes per child-year, and in all ages it was 0.04 episodes per person-year. Most episodes of LRTI/CAP are treated in community settings. [17- 20]

In the UK, CAP affects approximately 1% of the UK adult population each year, accounting for over 100,000 hospital admissions. The average length of stay is 6 days and estimated direct healthcare costs are £441 million. In the US, the annual incidence of CAP requiring hospitalization has been estimated at around 46 per 10,000 adults. This compares with lower estimates from other parts of the world. Incidence rises steeply in adults aged > 65 years.[21]

In Sub-Saharan Africa, the incidence of CAP is dominated by the effect of HIV infection. The prevalence of HIV within cohorts of patients with CAP is 50–75%. In a community surveillance study in Kenya, the annual incidence of pneumococcal acute respiratory infection was 50 per 10,000 persons in HIV negative individuals compared to 670 per 10,000 persons in HIV positive individuals.[22]

India contributes about 23 per cent of the global pneumonia burden and 36 per cent WHO regional burden in patients under five years. Reliable estimates of disease burden are not available particularly for the adult population. The sparse data for adults come from a tertiary care teaching hospitals using cross-sectional studies. A study from Mumbai reported that severe CAP (SCAP) reached 19 per cent of all patients and Streptococcus pneumoniae and Gram-negative bacteria (Pseudomonas aeruginosa and Klebsiella pneumoniae) had increased occurrence in severe pneumonia. A recent review underscores the importance of pneumococci in the invasive pneumococcal diseases in India. The reported case fatalities are between 14 and 30 per cent in all CAP patients and 47 per cent in SCAP.[23, 24]

ETIOLOGY

Etiology of CAP may be infective or non-infective causes.[16, 17]

Infective causes include bacterial as well as viral causes. The bacteria are responsible for various types of pneumonia such as Staphylococcal pneumonia, Pneumococcal pneumonia, Pseudomonas pneumonia, Klebsiella pneumonia, Haemophilus influenza pneumonia, Escherichia pneumonia, Chlamydia pneumonia, Morexella catarrhalis pneumonia, Mycoplasma pneumonia and Legionella pneumonia. The viruses responsible for causing infection include Measles virus, Influenza, cytomegalovirus, Hantavirus, Respiratory syncytial, Coronavirus and Metapneumovirus. Other agents like coccidiodes, histoplasma, parasitic pneumonia and blastomycosis produce pneumonia.[17- 20]

Non-Infective causes like Radiation Pneumonia and lipid physical pneumonia. The most common causes of CAP depend on the situations where the infection occurs.[3, 4] In the outpatients, Streptococcus pneumoniae, Mycoplasma pneumoniae, Haemophilus influenzae, Chlamydia pneumoniae as well as respiratory viruses are among the causative microorganisms. Among non - ICU hospitalized patients, microbial etiologies include Streptococcus pneumoniae, Mycoplasma pneumoniae, Chlamydia pneumoniae, Haemophilus influenzae as well as Legionella. While among those admitted to the ICU, the microbial causes include Streptococcus pneumoniae, Staphylococcus aureus, Legionella, Gram - negative bacilli as well as Haemophilus influenzae. [17- 20]

According to the risk factors and epidemiologic conditions, the pathogen etiological agent may vary in CAP. Under different circumstances, different types of pathogens are commonly encountered.[5] When the age of the patient is over 65 years, Streptococcus pneumoniae is usually the cause of infection. In conditions like chronic obstructive pulmonary disease, diabetes Mellitus, chronic renal or liver failure, neurological diseases, CVS

diseases or a recent viral infection, pathogens commonly observed are Staphylococcus aureus, Gram-negative enteric bacilli, Streptococcus pneumoniae as well as Haemophilus influenzae. At the time of aspiration, oral anaerobes and gram-negative enteric bacilli are detected. When an individual is exposed to bird or bat droppings, Histoplasma capsulatum is frequently encountered.[17-20]

Streptococcus pneumonia, M.tuberculosis as well as Haemophilus influenzae are detected in early phase of HIV infections whereas Cryptococcus, Pneumocystis jirovecii, Aspergillus Histoplasma, P.aeruginosa along with Atypical mycobacteria in addition to Streptococcus pneumonia, M.tuberculosis and Haemophilus influenzae are found in late stages HIV infections. People who visit or live in the southwest United States typically have hantavirus and Coccidiodes species in their systems. In a neighbourhood where the influenza virus is active, Staphylococcus aureus, Streptococcus pneumoniae, and Haemophilus influenzae are frequently seen. In structural lung disorders, Burkholderia cepacia, P. aeruginosa, and Staphylococcus aureus are frequently seen such as Bronchiectasis. Staphylococcus aureus, Streptococcus pneumoniae, Haemophilus influenzae and Anaerobes are detected commonly in endobronchial obstruction. In alcoholism, Streptococcus pneumonia, M.tuberculosis, Acinetobacter species, Klebsiella pneumonia as well as Oral anaerobes are frequently encountered. Among those in institutions, Staphylococcus aureus, Gram-negative enteric bacilli, Streptococcus pneumonia and Anaerobic bacteria are common. Streptococcus pneumoniae, Haemophilus influenzae, Legionella species, P.aeruginosa, Chlamydophilis pneumonia and Moraxella catarrhalis are detected in those who smoke or those who suffer from COPD.[17- 20]

Staphylococcus aureus, M.tuberculosis, Community acquired MRSA Atypical mycobacteria, Endemic fungal along with Oral anaerobes are evident in cases of lung abscess. Chlamydophilia psittaci is evident in those who are exposed to birds whereas Coxiella burnetti is observed

in individuals who get exposed to parturient cats or farm animals. Bordetella pertussis is observed in those with post-tussivative vomiting or whooping cough for 12 weeks. Staphylococcus aureus, M.tuberculosis, Streptococcus pneumonia and Anaerobes are evident in cases of drug use as injection. Resistant microorganisms as well as Streptococcus pneumonia are usually evidence in those who are treated with antibiotics like penicillin and others. Severe acute respiratory syndrome, Avian influenza along with Burkholderia pseudomallei are seen in those who travel to in south east and east Asia.[17- 20]

Classification of Pneumonia:

Based on different studies, there are different types of classification as described below.[25]

1. Anatomical classification:

a) Bronchopneumonia
b) Lobar pneumonia
c) Segmental Pneumonia
d) Sub segmental Pneumonia

2. Microbiologist's classification

a) Bacterial
b) Bacteria like and Rickettsia like pneumonia
c) Viral
d) Fungal
e) Chemical Pneumonia
f) Parasitic Pneumonia
g) Physical pneumonia – ionizing pneumonia

3. Empiricist's classification:

a) Hospital Acquired Pneumonia
b) Community Acquired Pneumonia
c) Immunocompromised pneumonia – AIDS related
d) Aspiration pneumonia.

4. Behaviorist's classification:

a) Difficult pneumonia

b) Easy pneumonia

Causative organism-based classification of pneumonia is more widely used when compared to the anatomical-based classification of pneumonia. There are some conditions when a lesion in the lung is diagnosed as pneumonia but it fails to respond to treatment or rather it responds very late, then we name it as Non-Resolving Pneumonia.[26, 27]

CAP is defined as symptoms less than one-week cough with or without expectoration, shortness of breath, pleuritic pain with at least one systemic feature such as chills and rigor, temperature more than 37.7 degree Celsius or malaise and new focal chest sign like Bronchial breath sound or crackles and having no other explanation for the illness and patient is not in the hospital or other health care system and patient acquired infection in community setting.[26, 27]

With available chest radiography in the hospital, CAP is defined with above said symptoms and chest X-ray findings of patchy or lobar consolidation. Before diagnosing Pneumonia, we should rule out some conditions as pulmonary edema, pulmonary infarction and acute respiratory distress syndrome.[26, 27]

PATHOGENESIS:

Lung Anatomy:

Lung is like a spongy structure which helps in purifying blood. The right lung has three lobes as compared to left lung which has two lobes and the middle lobe of the right lung relates to the lingual in the left lung. The right lung is larger when compared to the left lung. The middle lobe of the right lung relates to the lingual in the left lung. When right Compared to the left one, the main bronchus is more vertical. Due to this, aspirated substances like vomit, blood, or any other foreign body enter the right lung more frequently than the left lung. Bronchioles are

produced by both bronchi. Since they lack cartilage and submucosal glands, bronchioles vary from bronchi. Distally to terminal bronchioles known as acinus, which are spherical around with 7mm diameter, bronchioles give rise to terminal bronchioles with a diameter less than 2mm.Respiratory bronchioles follow terminal bronchioles to alveolar ducts, which branch out to form alveolar sacs. Blind ends called alveolar sacs are where gas exchange occurs.[28-30]

Alveoli have several Pores of Kohn, which are not solid in nature. These holes allow passage of microorganisms and exudates between neighbouring alveoli.[15] From the mouth cavity to the excretory channel, our human body has a large variety of microbial species. The upper respiratory tract is home to more than 200 different microbial species, including both aerobic and nonaerobic microorganisms. The lower respiratory tract is generally thought to be sterile below the level of the larynx [16]. Clinically speaking, the severity of a respiratory tract infection can range from a mild condition like the common cold to a serious condition like pneumonia. The lower respiratory tract becomes infected by microorganisms by inhalation and contaminated micro droplets. The increased aspiration of nasopharyngeal flora and prolonged exposure to contaminated air render the lung parenchyma more susceptible to microbial invasion. Particles with a diameter of less than 5 micrometers can easily enter the alveoli. Nasal secretions can provide a trap for particles larger than 10 micrometers17. More than 100 micrometer-sized particles precipitate easily yet are difficult to breathe in.[28- 30]

In upright position the inhaled micro-organism deposit is higher in the lower lobe, since lower lobe has plenty of ventilation in upright position. Comparing to other type of pneumonia, inhalation pneumonia is very easily affected and more often are due to microorganisms which are size less than 5 micrometers, high inoculums carrier, in transit time it survives long enough, remain suspend in the air, can travel long in air, defeat local host defense mechanism easily.

There are several ways through which infection spreads such as aerosol inhalation, aspiration, oropharyngeal secretion, haematogenous spread and reactivation of latent microorganisms.[28-30]

Defense Mechanism

Lung maintains its bacteria free position by an immune respiratory defense mechanism and non-immune respiratory defense mechanism, which works very effectively at different levels of lungs. The respiratory defense mechanisms are located in different levels which are as follows.

a. Nasopharynx acts as a defense mechanism by the presence of nasal hair and turbinates, IgA secretions and mucociliary apparatus.

b. Trachea and bronchi acts as defense mechanism by cough, epiglottic reflex, immunoglobin (IgG, IgM and IaA) secretions and mucociliary apparatus.

c. Terminal airways and alveoli acts as defense mechanism by pulmonary lymphatics, cell mediated immunity, alveolar macrophages, cytokines (interleukin – 1, tumor necrosis factor), alveolar lining fluid (surfactant, complement, Ig, fibronectin) and polymorphonuclear leukocytes.[30]

Sometimes the above said defense mechanisms may get impaired, which leads to failure to defense the microbes entering in to lungs and cause damage causing infection. They are as follows: Depressed glottis reflex and cough- This may lead to the aspiration of gastric content in old age patients and patients with thoracoabdominal surgery, COPD and neuromuscular disease. Alteration of normal oropharyngeal flora- Microorganism colonization is the oropharynx is prevented by the presence of normal flora, complement and local immune globulins mainly immunoglobulin A. some chronic systemic disorders, malnutrition, diabetes and alcoholism reduce salivary fibronectin levels and increase gram-negative bacilli colonization. Resistant gram-negative bacilli colonization may be due to suppression of the normal oral flora due to over usage and misusage of inappropriate antibiotics.

Mucociliary apparatus mechanism impairment- Physical properties of mucus and effective ciliary motion causes effective mucociliary clearance.[31]

Airway surface fluids are produced by surface epithelial goblet cells and submucosal glands. This fluid consists of the lower layer of non-gel liquid and upper gel like mucin. The cilia push gel towards the mouth. Exposure to hot or cold air, chronic cigarette smoking, some harmful gases and viral respiratory infections cause damage to mucous from the larynx up to the terminal bronchioles. Altered Consciousness- During deep sleep, approximately 50% of oropharyngeal secretions are aspirated by a normal healthy individual. Oropharyngeal contents, which contain over 100 million bacteria per milliliter of secretion may often aspirate in some conditions like alcoholism, seizure, coma, CNS depressant drugs over dosage and cerebrovascular accidents. Immune dysfunction- Infections caused by pathogenic microorganisms are fought with the help of immune system including respiratory tract. Recognition of antigens by B and T lymphocytes are important for immune response. Such responses are regulated by macrophages, mast cells, neutrophils, pulmonary dendritic cells and eosinophils. Immunosuppressive therapies, disorders of lymphocytes, granulocytes and congenital/ acquired immune deficiencies may predispose to infection like pneumonia.[32]

Dysfunctions of alveolar macrophage- Alveolar macrophages are very highly effective phagocytic cells that are capable of scavenging very wide spectrum of particulate bodies. Lysosomal system breaks microorganisms, substance escapes this will be isolated in secondary lysosomes and stay there for a life span of macrophages. Generation of reactive oxygen species, toll-like receptor protein and nitric oxide formation are other important macrophages. By causing impairment of alveolar macrophages, chronic anemia, hypoxemia, prolonged starvation, respiratory viral infection and chronic cigarette smoking helps in the occurrence of pneumonia.[33]

CAP is mainly caused by bacteria or viruses. Most of the time viral infection follows bacterial infection. Invasion of bacteria to lung parenchyma causes the filling of alveoli with inflammatory exudates which causes Consolidation or solidification of lung tissue. There are different factors that determine the form of pneumonia such as host reaction, specific etiologic agent and extent of involvement.[33]

On basis of anatomic distribution, bacterial pneumonia is divided into two gross patterns: Lobar pneumonia and lobular bronchopneumonia. Lobar pneumonia is an acute bacterial infection causing fibrinosuppurative consolidation of an entire lobe or a large portion of a single lobe. Bronchopneumonia causes patchy consolidation of lung.[33]

Many times the anatomical pattern of classification overlaps and it's really difficult to differentiate what kind of pneumonia it is. For example, the use of antibiotic restricts the progression of the disease and express as subtotal infection or sometimes diffuse patchy consolidation expresses as the lobar pattern. Moreover, an organism can cause lobar pneumonia in one patient and can cause bronchopneumonia in another patient.[33]

From clinical stand point is very important to determine the extent of the disease and identify the causative organism. The inflammatory response in Lobar pneumonia is classified in four stages as follows- Congestion, Red hepatization, Grey hepatization and Resolution.

In recent days use of antibiotics halts or slows down the progression of the disease. In the Initial stage of consolidation, the lung is red, boggy and heavy, which is characterized by interalveolar fliud with neutrophils, vascular engorgement and the presence of plenty of bacteria. The red hepatization stage is characterized by alveolar space filled with massive exudates with fibrin, neutrophils and red cells. The lobe appears airless, firm, red and liver like consistency. So the stage is

termed Red Hepatization. The red cell disintegrates progressively and fibrinosuppurative exudate persistence makes the lung surface dry and gives a gross appearance of grayish brown. This stage is Gray Hepatization. In the final Resolution stage, fibrinous, bacteria and neutrophils get cleared and in alveolar space macrophages reappear, as the inflammatory response.[34]

Pneumonia Caused by Different Microbes:[34]
Streptococcus pneumoniae: The most common and most important cause of CAP is Streptococcus pneumoniae. Haemophilus influenza: CAP caused by both encapsulated and unencapsulated forms of haemophilus influenza. Staphylococcus aureus: Nosocomial pneumonia is mainly caused by S.aureus. S. aureus is the most important cause of secondary bacterial pneumonia after viral respiratory illnesses, in healthy adults and children, for example, influenza in both adults and children and measles in children.[26] Moraxella catarrhalis: Along with H. influenza and S. Pneumonia, otitis media is caused by M. catarrhalis in children. Klebsiella pneumonia: Gram- negative bacterial pneumonia is most frequently caused by K. pneumoniae. Legionella pneumophila: In upper respiratory tract, without pneumonic symptoms, self-limiting infection caused by L. pneumophila is Pontiac fever. Pseudomonas aeruginosa: P. aeruginosa is seen most commonly in nosocomial pneumonia.

Lifestyle factors and risk of CAP

The potential association between lifestyle factors and the risk of CAP was investigated in various case-control studies, performed in France, Germany, The Netherlands, Spain and the UK. There was consistent evidence that smoking was associated with an increased risk of CAP.[35-37]

Compared with non-smokers (OR 1.00), the risk of CAP was increased in current smokers and former smokers.[33]

Compared with individuals who consumed no alcohol (OR 1.00), consumption of ≤40 g of alcohol daily appeared to protect against CAP (21–40 g/day). However, the risk increased in individuals with higher consumption (>41 g/day; >80 g/day), or with a history of alcohol abuse/alcoholism.[38]

In general, being underweight was linked to a higher risk of CAP than having a normal body weight. Overweight people had a decreased risk, whereas obese people either had a lower risk or the same risk as people who were of normal weight.[38,39]

The structure of the household was linked to the risk of CAP. Having a crude OR of 2.20 was related to living in a home with more than 10 individuals. Frequent interaction with kids elevated the risk of CAP as well. According to two studies, having children increased the adjusted OR from 1.00 for "no children" to 3.2 or 3.41 for households with three or more children. There was conflicting information about the impact of pet contact; one study showed a higher risk of CAP, while another among young adults (aged 16 to 40) reported a lower risk.[37- 39]

Higher levels of education were associated with a lower risk of CAP. Compared with individuals with a low level of education, the risk declined in those with an intermediate or high level. In another study, individuals with ≥12 years of education had a lower risk of CAP compared with those who had ≤9 years of education.[37-39]

Two studies found that visiting the dentist was associated with a decreased risk of CAP. In contrast, one study found that frequent visits to the general practitioner in the previous year were associated with a substantial increase in the risk of CAP.[37,38,40]

Comorbid conditions and risk of CAP

In many case-control studies, the relationship between comorbidities and the risk of CAP was examined. A higher risk of CAP was linked to

a history of respiratory illness. A previous episode of pneumonia raised the likelihood of another one. A patient's risk of developing CAP was increased by two to four times if they had a chronic respiratory condition like COPD, bronchitis, or asthma. This association is also supported by further data. Another study revealed adjusted RRs of 2.82 for COPD and 1.58 for asthma, while one study reported an adjusted OR of 2.47 for chronic respiratory disease.[37,38]

Patients with at least one respiratory tract infection in the past year were also at increased risk of CAP to 4.5. In young adults, the risk of CAP increased in line with the number of infections over the previous 6 years.[39-42]

Chronic cardiovascular disease increased the risk of CAP up to threefold. Additional studies supported an association between chronic heart disease or heart failure and the risk of CAP.[39-42]

Cerebrovascular disease/stroke and dementia approximately doubled the risk of CAP. Other neurological or psychiatric conditions were also associated with an increased risk of CAP in some studies; Parkinson's disease and multiple sclerosis.[39-42]

Two studies in elderly patients found a strong association between dysphagia and the risk of CAP. A large database study in patients aged ≥65 years reported a crude OR of 2.10 whereas a small study in patients aged ≥70 years reported a crude OR of 16.3 and an adjusted OR of 11.9. [39- 42]

Data from several studies suggested that diabetes mellitus was associated with a moderate increase in the risk of CAP.[39-42]

Cancer was also associated with a moderate increase in the risk of CAP. One study reported a fivefold higher risk in patients with lung cancer. [39-42]

Chronic liver or renal disease increased the risk of CAP approximately twofold (chronic liver disease; chronic renal disease). Associations between conditions affecting immune function and the risk of CAP were reported. There was a moderate increase in risk in patients with rheumatoid arthritis. Additionally, there was over a twofold increase in risk in patients with asplenia or with HIV or AIDS.[43-45]

In addition to the above medical conditions, a moderate increase in the risk of CAP was reported in patients with anaemia.[43-45]

Hospitalization in the previous 5 years was associated with an increased risk of CAP. The risk of CAP was increased in patients who had undergone either bronchoscopy or the passage of a nasogastric tube during the previous year. [43-45]

Clinical features

CAP generally presents in two forms as typical and atypical.[38,39]

Typical form

Streptococcal pneumonia is the most common pathogen causing atypical form of CAP. Though sometimes anaerobic and aerobic flora of the oral cavity and H. Influenza may also cause typical infection. Typical pneumonia is characterized by the sudden onset of fever, with or without chills, shortness of breath, productive cough with purulent sputum, hemoptysis, pleuritic chest pain, Tachypnoea, tachycardia and dullness as signs of pulmonary consolidation, rales and bronchial breath sounds may be expressed on physical examination.[38,39]

Atypical Form:

Atypical pneumonia is mainly caused by M. pneumoniae, but it also can caused by Pneumocystis carinii oral anaerobes, and Chlamydia pneumoniae. Unlike typical form, it is characterized by fever which is gradual in onset, shortness of breath and dry cough. Some extra pulmonary symptoms like myalgia, headache, fatigue, nausea,

vomiting, sore throat and diarrhea are also characterized in atypical pneumonia. On chest x-ray there are only minimal sign changes compared to typical form.[38,39]

CAP may sometimes express Non respiratory symptoms in lower lobe pneumonia, which may express as rigidity, abdominal pain and ileus. In severe forms patients may present with symptoms like marked confusion, and also present as cerebellar dysfunction, meningitis, metabolic disturbances and evidence of hypoxia. Patients who are severely ill may sometimes present with septic shock and with the evidence of organ failure.

We cannot rule out or confirm the pneumonia just only by the information obtained from the patient as history or by our physical examination with adequate accuracy.[38,39]

Diagnosis

The physician by asking the patient about his living circumstances, his occupation, history of travel, contact history with patients and exposure to animal history, may get clues about the microbial etiology of the infection. the clinical and radiological methods may help in concluding the diagnosis of pneumonia. And the laboratory infection will aid us toconcludetheetiologyoftheinfection.[30]

Clinical Diagnosis

Infectious diseases and noninfectious diseases such as chronic bronchitis - acute exacerbations, acute bronchitis, radiation pneumonitis, pulmonary embolism and heart failure are the differential diagnosis of CAP. Very careful history collecting of patients is more important. For example, worsening pulmonary edema suggested by known cardiac disease, Secondary to irradiation therapy suggested by underlying carcinoma[31]. Epidemiologic clues, like patient's recent travel history to known endemic areas, for example travel to south east Asia, may give alert to physician to reach the specific possibilities.

Moreover, the specificity and sensitivity of the physical examination findings are really very less as an average sensitivity of 58%and specificity of 67%.[40-42]

Radiological Diagnosis

Since there is very less sensitivity and specificity in physical findings is really necessary to differentiate CAP from the other conditions by using chest radiograph[32]. Sometimes etiological diagnosis can be suggested by radiological results, like tuberculosisis suggested by cavitation in the upper lobe and Staphylococcus aureus infection is suggested by pneumatoceles. In outpatients, treatment for CAP is done with the help of clinical and radiologic assessments, because most of the time laboratory results are unavailable to start initial treatment.

In some cases, the availability of rapid diagnosis and treatment is very important such as, for influenza virus infection, rapid diagnosis is very important to start anti-influenza treatment and for the secondary prevention of infection[33]. Usually CT is not necessary, but sometimes in a patient with foreign body or tumor causing post obstructive pneumonia, it is more useful to diagnose.[34]

Etiological Diagnosis

Only by clinical presentation it is difficult to determine the etiology of infection. Instead, support of laboratory results is more useful for the physician to diagnose. For patients in the intensive care unit, there is no data to prove the efficacy between treatment for a specific pathogen and empirical therapy. This leads to the questioning of microbial etiology establishment, mainly about cost effectiveness of diagnostic testing. Moreover, there are number of reasons that can leads to attempt an etiologic diagnosis. Narrowing of the beginning empirical therapy is doneby unexpected pathogen identification, that reduces the risk of resistance and also helps incorrect antibiotic selection.[35] Appropriate empirical therapy and resistance to antibiotics are difficult

to finalize without susceptibility data and culture.[43]

Blood Culture

The blood culture results gives very less useful information in spite of blood samples collected before the starting of antibiotic theraphy.[36] Blood culture report of hospitalized CAP patients are positive only approximately 5–14%, and S. pneumonia is isolated organism most frequently because of lack of significant outcome and of low yield values blood culture is no more considered as investigation for patient infected with CAP.[44-46]

Because of all empirical treatment which we use covers pneumococcus, blood cultured patients gets positive results. However, susceptibility data may allow narrowing of antibiotic therapy in appropriate cases. Patients of high risk criteria such as asplenia, neutropenia secondary to pneumonia, chronic liver disease or severe CAPor complement deficiencies blood culture should be done.[44- 46]

Polymerase chain Reaction

Polymerase chain reaction test is useful for micro organisms like mycobacteria and L. pneumophilus. Amplification of DNA and RNA of microorganisms is done by Polymerase chain reaction tests. Sometimes there is a special test called multiplex PCR which helps in detection of the nucleic acid of C.pneumoniae, M.pneumoniae, and Legionella spp.[37]

However, for research study purposes the PCR assays is limited. Also it helps us to identify the patients who need intensive care unit admission. In pneumococcal pneumonia patients, by PCR, documentation of an increased bacterial load is associated with an increased risk of patient need for mechanical ventilation, septic shock and death.[38,39]

Gram staining and sputum culture

The sputum Gram's stain is used to assure ensure that a sample which collected is suitable for culture. However, certain pathogens are identified by their characteristic appearance, by Gram's stain like S. aureus, S. pneumonia and gram-negative bacteria. Sputum sample said to be adequate for culture, only if it contains squamous epithelial cells <10 and >25 neutrophils per low power field. The Gram's stain and cultures specificity and sensitivity are highly variable. For example in a confirmed bacteremic pneumonia, sputum samples cultures is positive only about 50%.[45, 46]

The etiologies of milder and severe form of CAP are somewhat different, so there is a greatest benefit in the staining and culturing collected respiratory secretions. Physician should be careful with resistant pathogens and/or unsuspected pathogens and to start with correct modification of therapy. Sometimes specific stains for specific microbes may be very useful.[44- 46]

Many patients would have started antibiotic treatment and in some elderly patients are not able to produce enough amount of sputum for staining and culture, This may interfere in the staining and culture procedures. Because of dehydration the amount of sputum secreted is very less and when we try to correct the dehydration, there is increase in the production of sputum and it get infiltrate in lungs, which showsinfiltrative signs in chest x rays.[44- 46]

Bronchoalveolar lavage and deep suction aspirate sample collected from patients who are intubated and admitted in ICU when microbiology examination done immediately has a very high yield on culture.[44- 46]

Serological Examination

Between convalescent phase and acute phase serum samples, diagnostics of infection is generally considered by a titer rise of a

fourfold rise in specific IgM antibodies. In the olden days, atypical pathogen identification and also selected unusual causative organisms such as Coxiella burnetii is done by serologic tests. But now a days, however not commonly used because of the time taken to produce the convalescent phase samples final result.[44- 46]

Testing the Antigens

In urine, there are Two antigenic tests available to detect certain Legionella and pneumococcal antigens. The sero group 1 detected by this test was used for community acquired Legionnaires disease. The urine antigentest for pneumococcal is also quite specific and sensitive about >90% and 80% respectively. The specificity and sensitivity of the urine antigen test for Legionella are as very high as 99% and 90%, respectively. [44-46]

Even after the beginning of antibiotic therapy, antigens can be detected by both tests. The test is mostly reliable, though false-positive results were obtained with samples collected from children colonized by pneumococcus. Some other test has poor sensitivity like rapid and direct fluorescent antibody tests for respiratory syncytial virus and influenza virus.[38-40]

OUTCOME AND MORTALITY

CAP is identified as the commonest cause of sepsis and septic shock in adults. GenOSept study from Europe showed ICU mortality of 19 per cent and independent factors associated with outcome were APACHE II score, haematocrit, mechanical ventilation and blood pH. S. aureus was related with SCAP fatality. Another study on non-streptococcal SCAP demonstrated shock at admission and acute kidney injury as significant risk factors for mortality while combined antibiotic therapy and early antibiotic therapy within three hours were associated with a favourable outcome. Legionella and P. aeruginosa were less likely to be covered empirically and hence showed worse outcome. The association of microbial aetiology with mortality is less understood.

Gram-negative bacterial pneumonia and bacteraemia were found to be independent risk factors for mortality, and S. aureus pneumonia was shown to be associated with more organ failure.[47,48]

Poovieng, J et al in a previous study reported that the overall inhospital mortality rate of inpatients with pneumonia was 31.2%. This was higher when compared with that in nationwide hospital admission data in 2010 reporting that the mortality rate among adults aged ≥ 60 years with pneumonia was approximately 9.2–15.5%.[48,49] Poovieng, J et al found that the inhospital and 28-day mortality rate in CAP and HCAP were comparable while approximately twice higher in HAP.[49] Osman, M. et al in a study conducted at Bamrasnaradura Infectious Diseases Institute in Thailand reported mortality associated with CAP to be 17.9%. Mortality rates for patients hospitalized with CAP reported by related studies have ranged from 12 to 30%.[42-44] In Korean tertiary teaching hospitals, overall mortality associated with CAP was 6.3% (Ahn JH et al).[50, 51]

In a study conducted by Abdullahi BB et al in Indian subcontinent, overall mortality rate among CAP patients was reported to be 16 percent.[52] Other studies have reported that the mortality rate of CAP patients in outpatient settings is 1%–5%, and in Intensive Care Unit, it is 25% (Shah et al). Vanjare PH et al, in another previous study reported that the overall inpatient mortality was 38%.[52, 53]

Fine MJ et al 1999 described the processes of care assessed a broad range of medical outcomes for ambulatory and hospitalized patients with community-acquired pneumonia. Data were collected via patient interviews and reviews of medical records for 944 outpatients and 1343 in patients with clinical and radiographic evidence of community-acquired pneumonia. Processes of care and medical outcomes were assessed 30 days after presentation. Only 29.7% of outpatients had 1 or more microbiologic tests performed, and only 5.7% had an assigned microbiologic cause. Although 95.7% of inpatients had 1 or more

microbiologic tests performed, a cause was established in only 29.6%. Six outpatients (0.6%) died, and 3 of these deaths were pneumonia related. Of surviving outpatients, 8.0% had 1 or more medical complications. At 30 days, 88.9% (nonemployed) to 95.6% (employed) of the surviving outpatients had returned to usual activities, yet 76.0% of outpatients had 1 or more persisting pneumonia-related symptoms. Overall, 107 inpatients (8.0%) died, and 81 of these deaths were pneumonia related. Most surviving inpatients (69.0%) had 1 or more medical complications. At 30 days, 57.3% (nonemployed) to 82.0% (employed) of surviving inpatients had returned to usual activities, and 86.1% had 1 or more persisting pneumonia-related symptoms. Although outpatients had an excellent prognosis, pneumonia-related symptoms often persisted at 30 days. Inpatients had substantial mortality, morbidity, and pneumonia-related symptoms at 30 days.[54]

Farr BM et al 2000 conducted a study on risk factors for community-acquired pneumonia diagnosed upon hospital admission. Among persons admitted to hospitals, a case-control study evaluating the risk factors for developing community-acquired pneumonia is reported. These were patients who survived and were admitted to 14 hospitals in England (n=178). The controls were people (n=385) who were chosen at random from the electoral rolls of the regions the hospitals served. Using a standardised postal questionnaire, the risk variables for pneumonia were compared between the two groups. Age, lifetime cigarette smoking history, chronic obstructive pulmonary illness (chronic bronchitis and/or asthma), occupational dust exposure, childhood pneumonia, single marital status, unemployment, and heart disease were independent risk factors linked to instances in log-linear regression analysis. Corticosteroid and bronchodilator therapy were also independent risk factors in the log-linear regression analysis, but may reflect the severity of underlying lung disease for which these drugs were prescribed. These data suggested that cigarette smoking is the major avoidable risk factor for acute pneumonia in adults.[55]

Rosón B et al 2001 performed an observational analysis of prospectively collected data on 533 nonseverely immunosuppressed adult patients who were hospitalized for community-acquired pneumonia on the basis of conventional admission criteria. For this population, they correlated etiology, reasons for admission, and outcomes using the Pneumonia Severity Index (PSI), to identify major discrepancies between the PSI risk class and the conventional criteria for deciding the site of care. PSI classes and corresponding mortality rates were as follows: class I, 51 patients (0%); class II, 62 (2%); class III, 117 (3%); class IV, 198 (10%); and class V, 105 (29%). They identified significant discrepancies between both methods. Overall, 230 patients (40%) who were hospitalized according to conventional criteria were assigned to low-risk classes. Of these 230 patients, 137 (60%) needed supplementary oxygen or had pleural complications; for the remaining patients, there were no irrefutable reasons for admission.[56]

Arancibia F et al 2002 calculated the occurrence of the patient survival of, and factors associated with CAP due to gram-negative bacteria (GNB), (including Pseudomonas aeruginosa) and a prospective study was conducted on consecutive CAP patients who were admitted to our 1,000-bed tertiary care university teaching hospital. Stepwise logistic regression analysis was used to find independent risk factors for both mortality and CAP due to GNB. There were 559 CAP patients that were hospitalized. Sixty patients (11%) had CAP brought on by GNB, of whom 39 (65%) had P aeruginosa. GNB was independently predicted by probable aspiration, prior hospitalization, prior antibiotic therapy, and the presence of pulmonary comorbidities. P aeruginosa pneumonia subgroup analysis revealed that pulmonary comorbidities and prior hospitalization were predictive. Death was independently linked to GNB infection. In a subgroup analysis of P aeruginosa pneumonia, pulmonary comorbidity and previous hospital admission were predictive. Infection with GNB was independently associated with death. In the setting, in every tenth patient with CAP, an etiology due to GNB has to be considered.

Patients with probable aspiration, previous hospitalization or antimicrobial treatment, and pulmonary comorbidity are especially prone to GNB.[57]

Colice GL et al 2004 assessed the medical and prescription drug (treatment) costs of managing CAP in an employed population. The costs of CAP were determined from an administrative claims database covering the years 1996 to 1998 for an employed population and their dependents [65 years of age (100,000 populations)]. Treatment costs for managing both inpatient and outpatient cases of CAP were calculated from payments by the health plan. A total of 7,249 episodes of CAP among 6,415 individuals were identified. The hospitalization rate was 19.6%, and the mortality rate for those hospitalized was 9.1%. Patients requiring hospitalization were older and had more comorbid conditions. The mean (± SD) treatment cost for an inpatient episode of CAP (including all inpatient and outpatient medical care) was $10,227 ± 15,342. The costs for inpatients who died during hospitalization (mean cost, $15,822 ± 26,541) were higher than for episodes in which patients were discharged from the hospital alive (mean cost, $9,595 ± 13,641). The mean treatment cost for an outpatient episode of CAP was $466 ± 1,038.[58]

Fujiki R et al 2007 outlined the possible risks for fatalities among individuals with community-acquired pneumonia in Japan. In Fukuoka, Japan, at the Social Insurance Tagawa Hospital, a prospective study was conducted. When the Pneumonia Patient Outcome Research Team (PORT) study assessed the risk class, all patients were treated in accordance with the 1993 American Thoracic Society recommendations for community-acquired pneumonia. We compared 227 occurrences of community-acquired pneumonia in 208 hospitalised patients, including demographic data, clinical indicators, underlying disorders, examination findings, severity of diseases, and causative microorganisms in both survival and mortality groups (128 men, mean age 67.7 years). The presence of a risk of aspiration, low systolic blood

pressure, low PaO2/FIO2 ratio, a high pneumonia score, and the presence of severe congestive heart failure were found to be independent risk factors for mortality from community-acquired pneumonia. The mortality in risk classes IV and V was 17.5% and 54.2%, respectively, and there was a significant correlation between risk classes. The risk factors they identify here are generally similar to those given in previous reports in Western countries. According to the prediction rule of the pneumonia PORT study, the risk classes were strongly associated with the mortality, and would be suitable and helpful for the management of patients with community-acquired pneumonia in Japan.[59]

Aliberti S et al 2008 defined the incidence, etiology, timing, and risk factors associated with clinical failures related to CAP vs those unrelated to CAP. It was an observational retrospective study on consecutive CAP patients. All patients who experienced clinical failure were identified. Cases were presented to a review committee that defined, by consensus, etiology, timing, and risk factors for clinical failures related to CAP. Among 500 patients who were enrolled in the study, clinical failure was identified in 67 (13%). Clinical failure was related to CAP in 54 patients (81%). The most common etiologies for clinical failure related to CAP were severe sepsis (33%), acute myocardial infarction (28%), and progressive pneumonia (19%). All cases of severe sepsis occurred in the first 72 h of hospitalization. The most common etiology for clinical failure unrelated to CAP was the development of hospital-acquired pneumonia (45%). At the time of hospital admission, factors associated with clinical failure related to CAP were advanced age, congestive heart failure, hypotension, abnormal gas exchange, acidosis, hypothermia, thrombocytopenia, and pleural effusion. The development of severe sepsis early during hospitalization is the primary etiology for clinical failure related to CAP. To achieve early treatment intervention, physicians should maintain a high index of suspicion for severe sepsis in hospitalized patients with CAP. To decrease the number of clinical failures unrelated to CAP,

interventions need to be developed at the local level to improve the processes of care for patients with pneumonia.[60]

Shah BA et al 2010 obtained comprehensive insight into the bacteriological and clinical profile of community-acquired pneumonia requiring hospitalization. The patient population consisted of 100 patients admitted with the diagnosis of community-acquired pneumonia (CAP), as defined by British Thoracic society, from December 1998 to Dec 2000, at the Sher- i-Kashmir institute of Medical Sciences Soura, Srinagar, India. Gram negative organisms were the commonest cause (19/29), followed by gram positive (10/29). In 71 cases no etiological cause was obtained. Pseudomonas aeruginosa was the commonest pathogen (10/29), followed by Staphylococcus aureus (7/29), Escherichia coli (6/29), Klebsiella spp. (3/29), Streptococcus pyogenes (1/29), Streptococcus pneumoniae (1/29) and Acinetobacter spp. (1/29). Sputum was the most common etiological source of organism isolation (26) followed by blood (6), pleural fluid (3), and pus culture (1). Maximum number of patients presented with cough (99%), fever (95%), tachycardia (92%), pleuritic chest pain (75%), sputum production (65%) and leucocytosis (43%). The commonest predisposing factors were smoking (65%), COPD (57%), structural lung disease (21%), diabetes mellitus (13%), and decreased level of consciousness following seizure (eight per cent) and chronic alcoholism (one per cent). Fourteen patients, of whom, nine were males and five females, died. Staphylococcus aureus was the causative organism in four, Pseudomonas in two, Klebsiella in one, and no organism was isolated in seven cases. The factors predicting mortality at admission were - age over 62 years, history of COPD or smoking, hypotension, altered sensorium, respiratory failure, leucocytosis, and staphylococcus pneumonia and undetermined etiology. The overall rate of identification of microbial etiology of community-acquired pneumonia was 29%, which is very low, and if serological tests for legionella, mycoplasma and viruses are performed the diagnostic yield would definitely be better.[46]

Brar NK and Niederman MS 2011 reviewed recent advances in the knowledge about the diagnosis and optimal management of CAP. Community-acquired pneumonia (CAP) is a leading cause of morbidity and mortality worldwide, affecting approximately 5.6 million patients annually in the USA, where the annual cost exceeds US$12 billion. Optimal management should be based on knowledge of the most likely etiologic pathogens for each patient, based on an assessment of specific risk factors. It is also essential to assess severity of illness, to determine the appropriate site of care, and to order appropriate diagnostic testing. New developments in CAP management have focused on recognizing newly identified pathogens, such as methicillin-resistant Staphylococcus aureus and novel H1N1 influenza, understanding when to utilize new microbiological diagnostic techniques, and how to use biomarkers to direct the appropriate utilization of antibiotics and to define the duration of therapy.[61]

Khawaja A et al 2013 conducted retrospective cross-sectional survey on patients with 16 years of age and older who were admitted with the diagnosis of SCAP in accordance with the American Thoracic Society Guidelines from March 2002 to December 2008 (2001). To determine the severity of the illness, as well as its genesis and other risk factors impacting how SCAP would ultimately turn out, the patients underwent clinical and diagnostic evaluations. The study involved 189 patients in total. There were 110 patients (58%) who were male, with a mean age of 60 18.0 years. Staphylococcus aureus (15 patients), Streptococcus pneumoniae (14 patients), and Pseudomonas aeruginosa were the most frequently identified pathogens (9 patients). Patients with Pseudomonas aeruginosa (89%) and Staphylococcus aureus (53) had the highest fatality rates. The mortality rate was 51% overall. On univariate analysis, there had been substantial differences between the patients who survived compared to those who did not for septic shock (p 0.001), prior antibiotic use (p = 0.04), blood urea nitrogen level > 30 mg/dl (p = 0.03), hematocrit 30% (p = 0.03), and Acute Physiology and

Chronic Health Evaluation (APACHE) II score > 20 (p 0.001). In multivariate analysis, septic shock was discovered to be independently associated with death (p 0.001, OR: 4.70; 95% CI= 2.49-8.87). The study's SCAP-causing microorganisms diverge from the typical spectrum. The most frequent infections that caused disease and were linked to a high mortality rate were Staphylococcus aureus and Pseudomonas aeruginosa. Setting up clinical recommendations for handling SCAP in accordance with the etiologic organisms present in the setting is crucial.[62]

Ishiguro T et al 2013 reviewed the etiologies of CAP using RIDT and to identify risk factors related to the severity and mortality of the disease. This retrospective study assessed these factors in hospitalized patients, with special emphasis on microbial etiology. A total of 1,032 patients aged 63.9±18.3 years were studied, 66.2% of whom were men. Microbial identification was obtained in 57.0% of the cases. The most frequent causative microbial agents were Streptococcus pneumoniae, Mycoplasma pneumoniae and the influenza virus, and the second most frequent pathogens in the patients with severe CAP and the non-survivors were S. pneumoniae and the influenza virus. Age (≥65 years), chronic obstructive pulmonary disease, congestive heart failure, diabetes mellitus, dementia and Legionella spp. infection and polymicrobial infection were each found to be independent factors related to severity in the multivariate analysis, whereas "unidentified pathogen" was found to be an independent factor for non-severe CAP. Age (≥65 years), chronic pulmonary aspergillosis, post-lung cancer surgery and severe CAP were found to be independent factors for non-survival according to a multivariate analysis. In addition to S. pneumoniae, the influenza virus was a frequent cause of CAP overall and a frequent causative pathogen in both severe cases of CAP and non-survivors. Legionella spp. infection and polymicrobial infection were found to be an independent factor for the severity of CAP along with advanced age and certain comorbidities. An advanced age, certain respiratory comorbidities and severe CAP

were found to be important independent factors for the mortality of CAP.[63]

Di Yacovo S et al 2013 performed an observational analysis of a prospective cohort of immunocompetent hospitalized adults with community-acquired pneumonia (CAP) to determine the epidemiology, clinical features, and outcomes of pneumonia in patients with diabetes mellitus (DM). They also analyzed the risk factors for mortality and the impact of statins and other cardiovascular drugs on outcomes. Of 2407 CAP episodes, 516 (21.4%) occurred in patients with DM; 483 (97%) had type 2 diabetes, 197 (40%) were on insulin treatment, and 119 (23.9%) had end-organ damage related to DM. Patients with DM had different clinical features compared to the other patients. They were less likely to experience abrupt onset, cough, purulent sputum, and pleural chest discomfort. There were no etiological differences between research groups. Although the case-fatality rate was comparable between the groups, patients with DM experienced greater acute metabolic problems while in the hospital. Age, bacteraemia, septic shock, and gram-negative pneumonia were independent risk factors for death in DM patients. Individuals who had end-organ damage from DM experienced more cardiac events while in the hospital and had a higher early case-fatality rate than the general group. Statin and other cardiovascular medication use was not linked to improved CAP results in DM patients. In conclusion, CAP in patients with DM presents different clinical features compared to the features of patients without DM.[64]

Wunderink RG and Yin Y 2016 conducted antibiotic resistance in community-acquired pneumonia pathogens. The overwhelming majority of cases of community-acquired pneumonia (CAP) can be treated with the standard antibiotic regimens of a macrolide and cephalosporin or a fluoroquinolone. Despite high rates, current levels of β-lactam resistance generally do not result in treatment failure for patients with CAP when appropriate agents and doses are used. Following the introduction of the pneumococcal conjugate vaccines, the

incidence of invasive pneumococcal disease declined drastically, coinciding with a decrease in penicillin resistance. Risk factors for methicillin-resistant S. aureus follow two patterns: (1) healthcare-associated risk factors and (2) pneumonia from exotoxin-producing community-acquired strains. The latter is associated with need for antibiotics which inhibit protein synthesis for optimal management. Since 2000, macrolide-resistance in M. pneumoniae has rapidly emerged worldwide, especially in Asian countries. The inability to routinely culture H. influenzae suggests that macrolide and β-lactam resistance, while present, is not a big issue. Unless risk factors for a hospital-associated strain are present, the most common Enterobacteriaceae to cause CAP, including Escherichia coli and Klebsiella, are generally susceptible to usual CAP antibiotics. Given the limited role of antibiotic resistance in CAP, a strong rationale is needed for use of antibiotics other than the standard β-lactam/macrolide or fluoroquinolone regimens.[65]

Almirall J et al 2017 performed a systematic review of the literature to establish conclusive evidence of risk factors for community-acquired pneumonia (CAP). Observational studies (cross-sectional, case-control, and cohort studies) the primary outcome of which was to assess risk factors for CAP in both hospitalized and ambulatory adult patients with radiologically confirmed pneumonia were selected. The Newcastle-Ottawa Scale specific for cohort and case-control designs was used for quality assessment. Twenty-nine studies (20 case-control, 8 cohort, and 1 cross-sectional) were selected, with 44.8% of them focused on elderly subjects ≥65 years of age and 34.5% on mixed populations (participants' age >14 years). The median quality score was 7.44 (range 5-9). Age, smoking, exposure to the environment, malnourishment, prior CAP, chronic bronchitis/chronic obstructive pulmonary disease, asthma, functional impairment, poor dental health, immunosuppressive therapy, oral steroids, and use of gastric acid-suppressing medications were all proven risk factors for CAP. Some of these elements can be changed. No conclusive

conclusion could be drawn about other factors (such as gender, obesity, alcohol consumption, recent respiratory tract infections, pneumococcal and influenza vaccination, inhalation therapy, swallowing problems, renal and hepatic dysfunction, diabetes, and cancer). Early identification and reversal of modifiable risk factors may lower morbidity and death in adult CAP patients, especially in the elderly.[38]

Ito A et al 2017 investigated the factors that affect prognosis, and evaluate the usefulness of existing pneumonia severity scores for predicting the prognosis of CAP. They retrospectively analyzed patients with CAP, excluding HCAP, who were enrolled prospectively between April 2007 and February 2016. Four patients who used macrolides other than azithromycin (AZM) were excluded. They used age, sex, comorbidities, laboratory findings and antimicrobial therapy as prognostic variables. The primary outcome was 30-day mortality and secondary outcome was ICU admission. They also performed receiver operating characteristic curve analysis of Pneumonia Severity Index (PSI), Infectious Diseases Society of America (IDSA)/American Thoracic Society (ATS) severe criteria, CURB-65 and A-DROP pneumonia severity scores. Increasing age, presence of COPD and malignancy as comorbidities, hypothermia, tachypnea, PaO2/FiO2 ratio ≤250 mmHg, low Alb level, high BUN level and mechanical ventilatory support predict a worse prognosis; AZM combination therapy should be considered for CAP, excluding HCAP. All four pneumonia severity scores are useful for assessing the severity of CAP defined by the latest criteria.[66]

Para RA et al 2018 aimed to study the microbial etiology of hospitalized adults with CAP. The study was conducted in a 700-bedded North Indian hospital. Consecutive adults admitted with CAP over a period of 2 years from 2013 to 2015 were recruited for the study, and apart from clinical evaluation underwent various microbiological studies in the form of blood culture, sputum culture, urinary antigen for

pneumococcus and Legionella, serology for Mycoplasma and Chlamydia and real-time reverse transcriptase polymerase chain reaction for influenza viruses. Radiographic studies were performed in all patients and repeated as required. The patients were treated with standard antibiotic/antiviral therapy and outcomes were recorded. A total of 225 patients (median age: 59 years) were enrolled. Streptococcus pneumoniae was the most common organism found (30.5%), followed by Legionella pneumophila (17.5%), influenza viruses (15.4%), Mycoplasma pneumoniae (7.2%), Chlamydia pneumonia (5.5%), Mycobacterium tuberculosis (4.8%), Klebsiella pneumoniae (4.8%), methicillin-resistant Staphylococcus aureus (3.5%), Pseudomonas aeruginosa (3.1%), methicillin-sensitive S. aureus (1.7%), and Acinetobacter sp. (0.8%) with 4% of patients having multiple pathogens etiologies. High Pneumonia Severity Index score correlated with the severity and outcome of the CAP but was not predictive of any definite etiological pathogen. In-hospital mortality was 8%. Streptococcus pneumoniae, Legionella, and influenza constitute the most common etiological agents for north Indian adults with CAP requiring hospitalization. Appropriate antibiotic therapy and preventive strategies such as influenza and pneumococcal vaccination need to be considered in appropriate groups.[67]

Nayar S et al 2019 talked about the existing CABP therapy guidelines and management restrictions, and of potential treatment solutions. Globally and in india , community-acquired bacterial pneumonia (CABP) is one of the main causes of illness and mortality. Gram-positive, Gram-negative, and unusual bacteria are reportedly encountered almost equally frequently. The burden of morbidity and death is significant and is due to a number of variables, despite advice in guidelines and antibiotic choices for the management of CABP. Failure of empirical therapy, probably because of insufficient microbial coverage, increasing bacterial resistance, and adverse effects of existing treatments, underlies the unsuccessful treatment of CABP, especially in India. Multiple novel therapies that have entered clinical

development phases have potential to address some of these issues.[68]

Aston SJ et al 2019 identified the risk variables for mortality and explained the current aetiology of CAP in Malawi. Blood culture, Streptococcus pneumoniae urine antigen detection, mycobacterial sputum culture and Xpert MTB/RIF, and nasopharyngeal aspirate multiplex PCR were used to determine the aetiology. 30-day mortality was 14.6% (64/439) in 459 patients (285 [62.1%] males; median age, 34.7 [interquartile range, 29.4-41.9] yr), and it was linked to male sex (adjusted odds ratio, 2.60 [95% confidence interval, 1.17-5.78]), symptoms lasting longer than seven days (2.78 [1.40-5.54]), tachycardia (2.99 [1.48-6.06]), hypoxia (3.59 [1.72–7.50]). Although it was commonly newly diagnosed (124/355; 34.9%), HIV was not linked to death (355/453; 78.4%). The two most frequently found pathogens were S. pneumoniae (98/458; 21.4%) and Mycobacterium tuberculosis (75/326; 23.0%). The most prevalent viral infection, with a prevalence of 32.6% (148/454) was influenza (40/454; 8.8%). 9.1% (28/307) of patients had bacterial-viral coinfection. Mortality was linked to M. tuberculosis detection. In the era of antiretroviral medication, CAP in Malawi continues to be primarily HIV related, with a significant portion attributed to infections that may be vaccine-preventable.[22]

Kanishan C et al 2020 defined the bacterial epidemiology of CAP, their antibiotic susceptibility profile, and outcome measures but since choice of initial treatment of CAP often remains challenging due to the development of drug resistant strains. 100 adults over the ages of 18 who had been diagnosed with CAP and were admitted for a year to a tertiary care hospital in South India participated in a prospective pilot trial. Within 48 hours of admission, samples of blood, sputum, endotracheal tip, and pleural fluid were collected for microbiological testing. Using the Kirby Bauer disc diffusion method, antimicrobial susceptibility testing was done on isolates that had positive culture results. The SPSS statistical software tool, version 22.0, was used to

conduct descriptive statistics and odds ratio calculations using a 95% confidence range. Gram negative bacteria were the predominant etiological agent responsible for CAP in the setting with multidrug resistant strains and severe clinical course. Chronic comorbid conditions must be monitored in order to increase the chance of survival among CAP patients.[69]

Lin CJ et al 2020 evaluated risk factors associated with hospitalization for CAP among HHC patients in Taiwan. This retrospective cross-sectional study extracted data from patients' electronic medical records between 1 January 2017 and 31 December 2017. Multiple logistic regression analyses were performed to explore factors associated with hospitalization for CAP. In total, 598 patients (men/women: 236/362) were included. One hundred ninety-nine patients (33.28%) were hospitalized for pneumonia. Inpatients showed a higher proportion of the following: male sex, functional impairment, hypoalbuminemia, anemia, nasogastric tube use, excessive polypharmacy, stroke, dementia, heart failure, chronic respiratory disease, and chronic liver disease. Furthermore, nasogastric tube use (odds ratio [OR] 3.01, 95% confidence interval [CI] 1.88–4.82), anemia (OR 2.37, 95% CI 1.48–3.80), male sex (OR 2.14, 95% CI 1.43–3.20), chronic respiratory disease (OR 2.09, 95% CI 1.33–3.30), dementia (OR 1.94, 95% CI 1.27–2.97), heart failure (OR 1.69, 95% CI 1.11–2.56), and hypoalbuminemia (OR 1.57, 95% CI 1.03–2.40) significantly increased the risk of hospitalization for CAP. The results revealed risk factors associated with hospitalization for CAP in HHC patients.[70]

Carugati M et al 2020 studied assessed the appropriateness of empiric guideline recommendations at a multinational level. This study aims at the following: (i) describing the bacterial etiologic distribution of CAP and (ii) assessing the appropriateness of the empirical treatment recommendations by clinical practice guidelines (CPGs) for CAP in light of the bacterial pathogens diagnosed as causative agents of CAP. Secondary analysis of the GLIMP, a point-prevalence international

study which enrolled adults hospitalized with CAP in 2015. The analysis was limited to immunocompetent patients tested for bacterial CAP agents within 24 h of admission. The CAP CPGs evaluated included the following: the 2007 and 2019 American Thoracic Society/Infectious Diseases Society of America (ATS/IDSA), the European Respiratory Society (ERS), and selected country-specific CPGs. Among 2564 patients enrolled, 35.3% had an identifiable pathogen. Streptococcus pneumoniae (8.2%) was the most frequently identified pathogen, followed by Pseudomonas aeruginosa (4.1%) and Klebsiella pneumoniae (3.4%). CPGs appropriately recommend covering more than 90% of all the potential pathogens causing CAP, with the exception of patients enrolled from Germany, Pakistan, and Croatia. The 2019 ATS/IDSA CPGs appropriately recommend covering 93.6% of the cases compared with 90.3% of the ERS CPGs ($p < 0.01$). S. pneumoniae remains the most common pathogen in patients hospitalized with CAP. Multinational CPG recommendations for patients with CAP seem to appropriately cover the most common pathogens and should be strongly encouraged for the management of CAP patients.[71]

Shoar S. et al 2020 reviewed English-language literature using PRISMA guidelines. In accordance with the results of the microbiologic tests, the data were divided into diagnostic groups. The inclusion criteria were satisfied by 146 articles with 82,674 CAP points; 63,938 (77.3%) of these were inpatients, 16,532 (20.0%) were in- or outpatients, and 2,204 (2.7%) were outpatients. Regardless of the microbiological methods employed, Pneumococcus was the most frequent cause of CAP (33-50% of all patients). The fraction attributable to this organism decreased with time, with the US experiencing a far more pronounced fall than Europe. Staphylococcus aureus and Enterobacteriaceae each accounted for 4–10% of cases, whereas Haemophilus influenzae accounted for the second-highest proportion (7–16%). Less frequently isolated bacteria included Pseudomonas (0.8-4.5%) and Moraxella (1.2-3.5%). Mycoplasma

caused 4-11% of CAP, Legionella 3-8%, Chlamydophila 2-7%, and Coxiella < 2%; some studies showed a much higher frequency of Mycoplasma. With routine use of viral PCR, a virus was identified in 30-40% of pts; bacterial/viral coinfection was found in 25-35% of these cases. In a separate study of CAP pts in whom viral PCR was positive, 40% had bacterial coinfection. Influenza viruses were identified in 6.2-13.7% of cases and rhinoviruses in 4.1-11.5%. RSV and human metapneumovirus were less common (0.4-4.7%), followed more distantly by other viruses. Even with the use of the most sophisticated diagnostic techniques, no etiologic agent for CAP was identified in > 50% of cases.[72]

Ferreira-Coimbra J et al 2020 conducted study on burden of community-acquired pneumonia and unmet clinical needs. Community-acquired pneumonia (CAP) is the leading cause of death among infectious diseases and an important health problem, having considerable implications for healthcare systems worldwide. Despite important advances in prevention through vaccines, new rapid diagnostic tests and antibiotics, CAP management still has significant drawbacks. Mortality remains very high in severely ill patients presenting with respiratory failure or shock but is also high in the elderly. Even after a CAP episode, higher risk of death remains during a long period, a risk mainly driven by inflammation and patient-related co-morbidities. CAP microbiology has been altered by new molecular diagnostic tests that have turned viruses into the most identified pathogens, notwithstanding uncertainties about the specific role of each virus in CAP pathogenesis. Pneumococcal vaccines also impacted CAP etiology and thus had changed Streptococcus pneumoniae circulating serotypes. Pathogens from specific regions should also be kept in mind when treating CAP. New antibiotics for CAP treatment were not tested in severely ill patients and focused on multidrug-resistant pathogens that are unrelated to CAP, limiting their general use and indications for intensive care unit (ICU) patients. Similarly, CAP management could be personalized through the use of

adjunctive therapies that showed outcome improvements in particular patient groups. Although pneumococcal vaccination was only convincingly shown to reduce invasive pneumococcal disease, with a less significant effect in pneumococcal CAP, it remains the best therapeutic intervention to prevent bacterial CAP.[73]

Hyun H et al 2022 compared the microbiological distribution, antibiotic resistance, and clinical outcomes in cases of CAP, HCAP, and HAP. The microbiological distribution, antibiotic resistance, and clinical outcomes in CAP, HCAP, and HAP were studied retrospectively. The susceptibility to standard CAP regimens (β-lactams plus macrolide or fluoroquinolone monotherapy) and rates of methicillin-resistant Staphylococcus aureus (MRSA) and Pseudomonas aeruginosa (P. aeruginosa) infections were evaluated in the CAP group and HCAP subgroups. In total, 933 cases were included (CAP, n = 557; HCAP, n = 264; HAP, n = 112). In the CAP and HCAP cases, Streptococcus pneumoniae (7.4% vs. 5.7%) and P. aeruginosa (9.2% vs. 18.6%) were the most common gram-positive and gram-negative pathogens. Staphylococcus aureus (methicillin-resistant, 2.7%; methicillin-susceptible, 2.4%) and carbapenem-resistant Acinetobacter baumannii (20.5%) were the most common Gram-positive and Gram-negative pathogens in the HAP group, respectively. Higher susceptibility to levofloxacin was observed in CAP and HCAP isolates than that to β-lactam agents. However, levofloxacin non-susceptibility was significantly higher in long-term care facility (LTCF)-onset HCAP compared to community-onset HCAP (43.6% vs. 22.7%, P = 0.014). HCAP showed higher rates of P. aeruginosa and MRSA infections than CAP. Empirical antipseudomonal therapy should be considered in the treatment of HCAP. Prior isolation of P. aeruginosa was the most important risk factor for P. aeruginosa infection.[74]

MATERIALS AND METHODS

This study will be conducted at Dayanand Medical College and Hospital, Ludhiana on patients with presumed pneumonia; presenting with symptoms of acute respiratory infection in the emergency department, medicine ward and intensive care unit (ICU).

SOURCE OF DATA

This will be observational prospective study to be conducted on all patient presenting with complaints of fever, cough, chest pain and breathing difficulty; fitting into the inclusion criteria of the study in the department of medical emergency of DMCH, Ludhiana over a period of 15 months

METHOD OF COLLECTION OF DATA

All patients presenting with signs and symptoms of pneumonia and willing to participate in the study after giving informed consent will be included in the study.

A thorough demographic history and clinical history will be obtained in the pre-designed study proforma. The clinical examination shall be done at the time of presentation and investigations which are part of evaluation like haemogram, metabolic profile, chest X-ray, radio-imaging, etc. shall be done. Outcome of the patient will be assessed at the time of discharge

Inclusion Criterion:

1. Age more than 18 years

2. Patients/ attendants agreeing to participate in the study after signing informed consent

3. 2 or more than 2 symptoms (fever, cough , chest pain and breathing difficulty)

4. Presence of new infiltrates on radio-imaging

Exclusion Criterion:

1. Consent not available

2. Age < 18 years

3. Patients having hospital acquired pneumonia (HAP)

4. Ongoing treatment for malignancy

5. Use of immunosuppressive medication.

METHODOLOGY: A written informed consent will be obtained from the patients who will satisfy the eligibility criteria. After enrollment into the study, Clinical history will be obtained.

Detailed clinical examination will be done. After clinical history, patients will be subjected to routine laboratory investigations which includes CBC, LFT, RFT including electrolytes, uric acid, Blood sugar, C-reactive protein (CRP), Arterial blood gases (ABG), chest X-ray and blood culture sensitivity. Wherever indicated special investigations in the form of sputum analysis, anti-SARS-CoV-2 antibodies Nasopharyngeal swabs (for PCR testing to detect H1N1 and SARS-Cov2), pleural fluid analysis, Galacatomann, (1,3) – BETA- D- Glucan (Fungitell), Procalcitonin, CECT chest and bronchoscopy will be done.

Duration of Study: 15 months (1 March 2021 to 30 May 2022).

Outcome: The patients will be followed during the course of hospital and will be assessed as per the duration of hospital stay; ICU admission; need of mechanical ventilation and any complications related to the disease process

Statistical Analysis:

Data will be described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program.

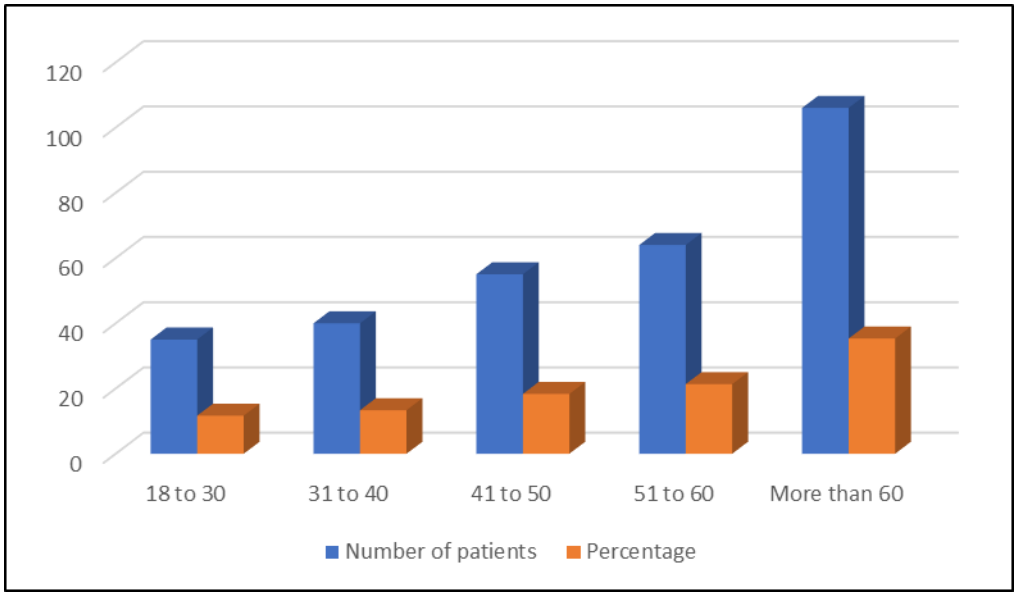
OBSERVATION & RESULTS

The present study was conducted to determine the etiology and clinical profile of patients presenting with community acquired pneumonia at our institute. A total of 300 patients were enrolled. Following results were obtained:

Table 1: Age-wise distribution of patients

Age group (years)	Number of patients	Percentage
18 to 30	35	11.67
31 to 40	40	13.33
41 to 50	55	18.33
51 to 60	64	21.33
More than 60	106	35.33
Total	300	100
Mean ± SD	52.85± 12.49	

Figure 1: Age-wise distribution of patients

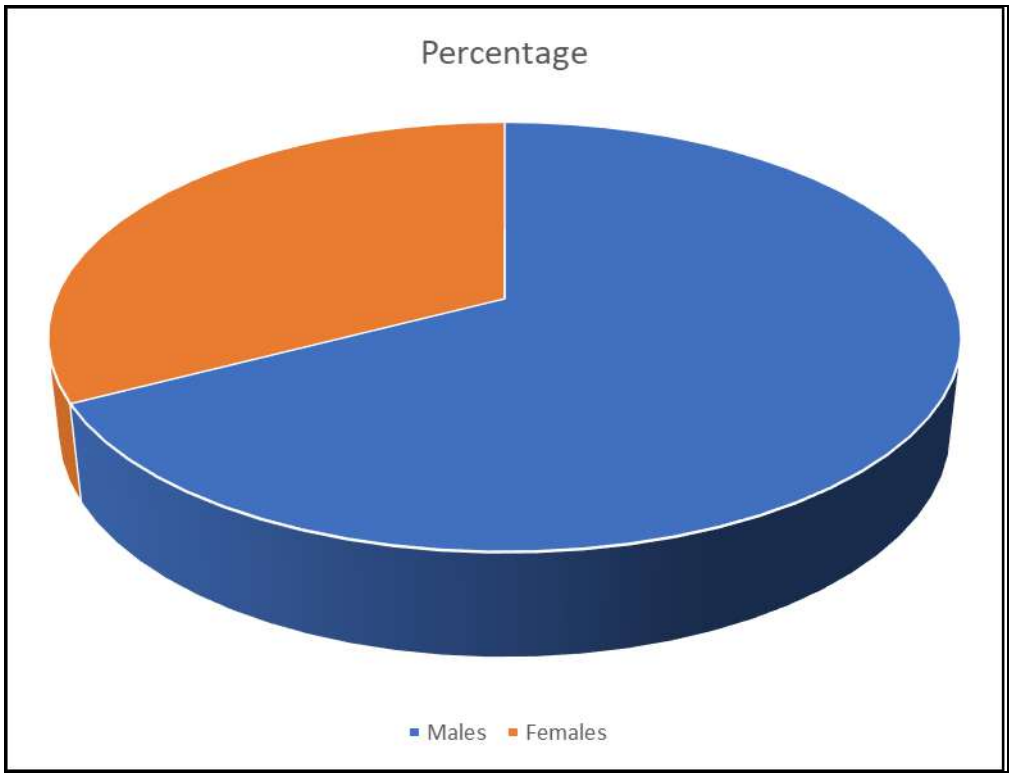


35.33 percent of the patients belonged to the age group of more than 60 years while 21.33 percent of the patients belonged to the age group of 51 to 60 years. 18.33 percent and 13.33 percent of the patients belonged to the age group of 41 to 50 years and 31 to 40 years respectively. Mean age of the patients was 52.85 years.

Table 2: Gender-wise distribution of patients

Gender	Number of patients	Percentage
Males	202	67.33
Females	98	32.67
Total	300	100

Figure 2: Gender-wise distribution of patients

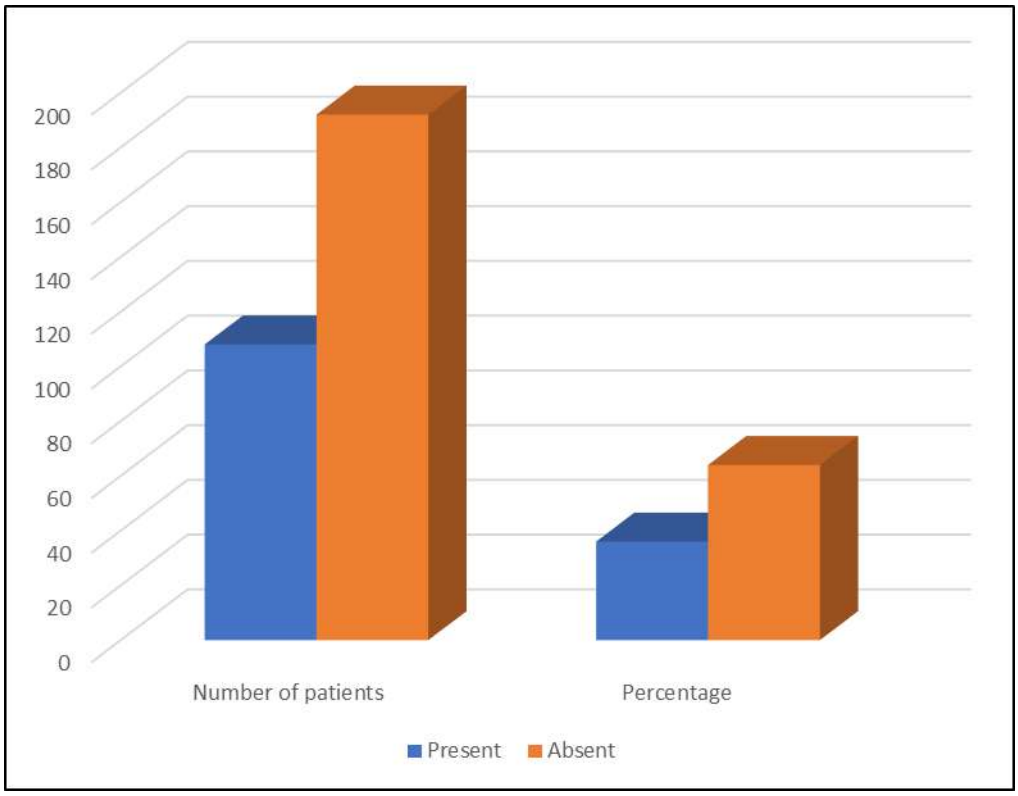


67.33 percent of the patients were males while the remaining were females.

Table 3: Distribution of patients according to smoking history

Smoking habit	Number of patients	Percentage
Present	108	36
Absent	192	64
Total	300	100

Figure 3: Distribution of patients according to smoking history

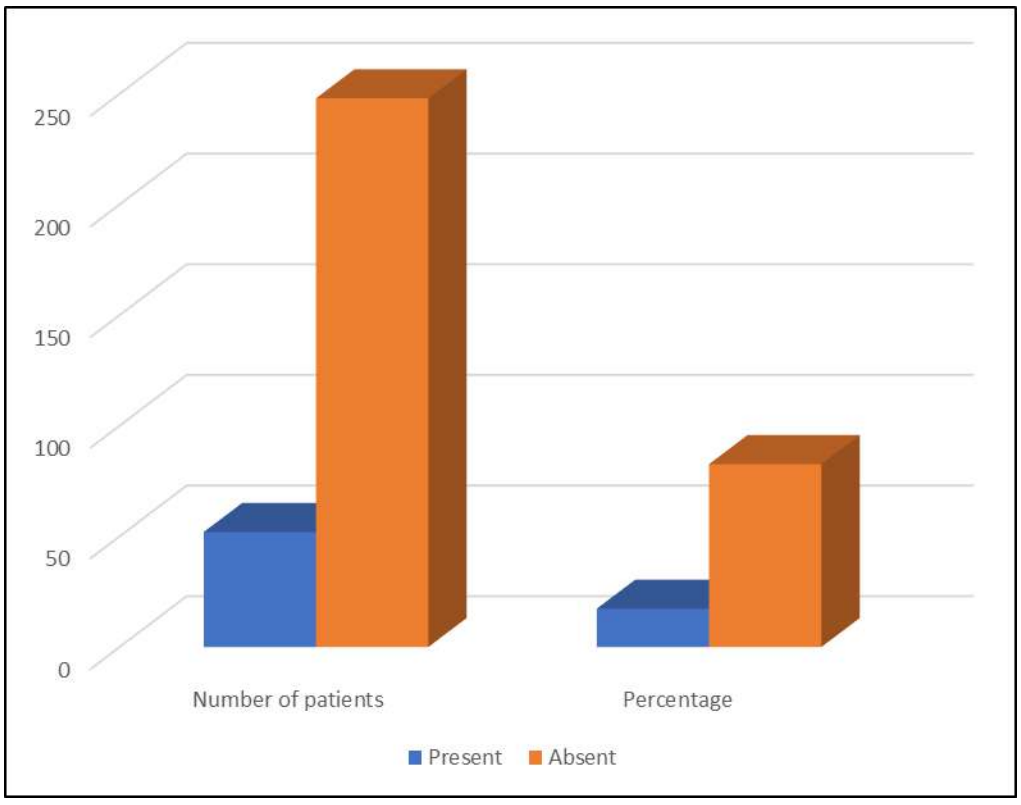


36 percent of the patients were smokers while the remaining were non-smokers.

Table 4: Distribution of patients according to history of biomass fuel exposure

History of biomass fuel exposure	Number of patients	Percentage
Present	52	17.33
Absent	248	82.67
Total	300	100

Figure 4: Distribution of patients according to history of biomass fuel exposure

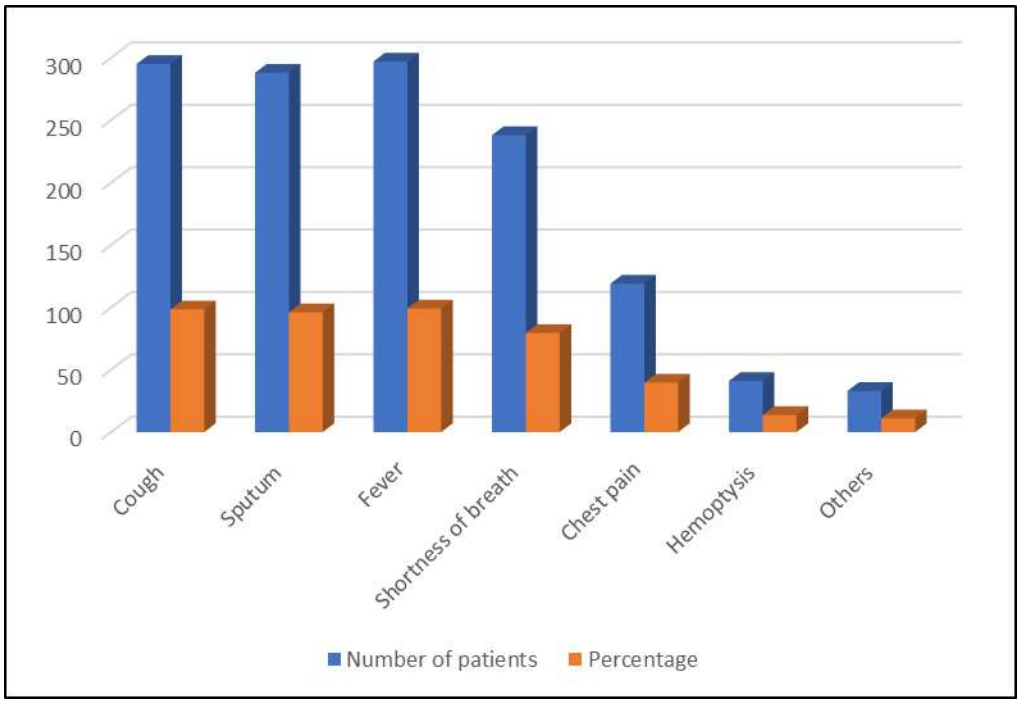


Positive history of exposure of biomass fuel was seen in 17.33 percent of the patients.

Table 5: Distribution of patients according to clinical profile

Clinical profile	Number of patients	Percentage
Cough	295	98.33
Sputum	288	96
Fever	297	99
Shortness of breath	238	79.33
Chest pain	119	39.67
Hemoptysis	41	13.67
Others	33	11

Figure 5: Distribution of patients according to clinical profile

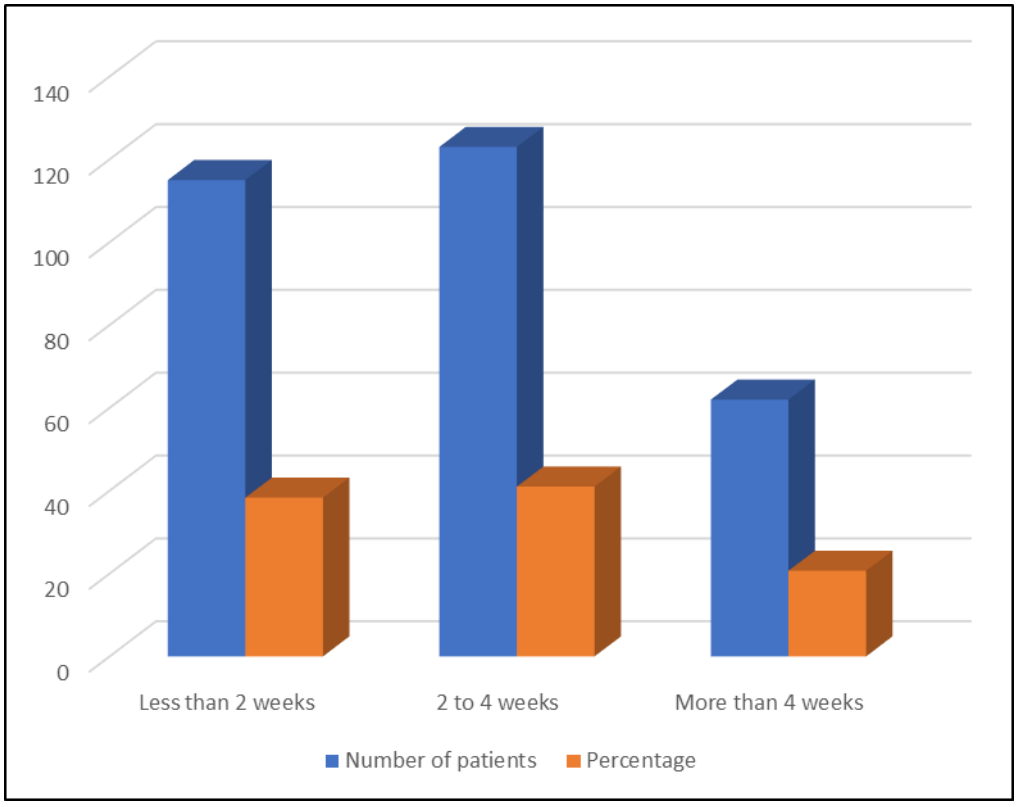


Cough and fever were seen in 98.33 percent and 99 percent of the patients respectively. Sputum and shortness of breath was seen in 96 percent and 79.33 percent of the patients respectively. Chest pain and hemoptysis were seen in 39.67 percent and 13.67 percent of the patients respectively.

Table 6: Distribution of patients according to duration of illness

Duration of illness	Number of patients	Percentage
Less than 2 weeks	115	38.33
2 to 4 weeks	123	41
More than 4 weeks	62	20.67
Total	300	100

Figure 6: Distribution of patients according to duration of illness

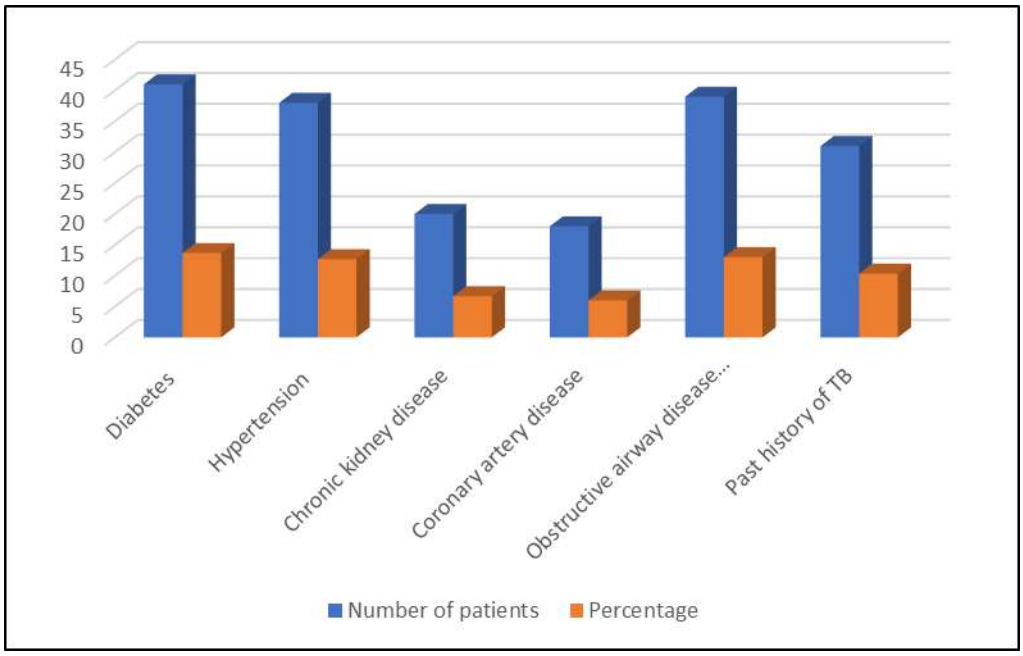


In 41 percent and 38.33 percent of the patients, the duration of illness was between 2 to 4 weeks and less than 2 weeks respectively. In 20.67 percent of the patients, the duration of illness was more than 4 weeks.

Table 7: Distribution of patients according to presence of Comorbid condition

Comorbidities	Number of patients	Percentage
Diabetes	41	13.67
Hypertension	38	12.67
Chronic kidney disease	20	6.67
Coronary artery disease	18	6
Obstructive airway disease (Asthma/COPD)	39	13
Past history of TB	31	10.33

Figure 7: Distribution of patients according to presence of Comorbid condition

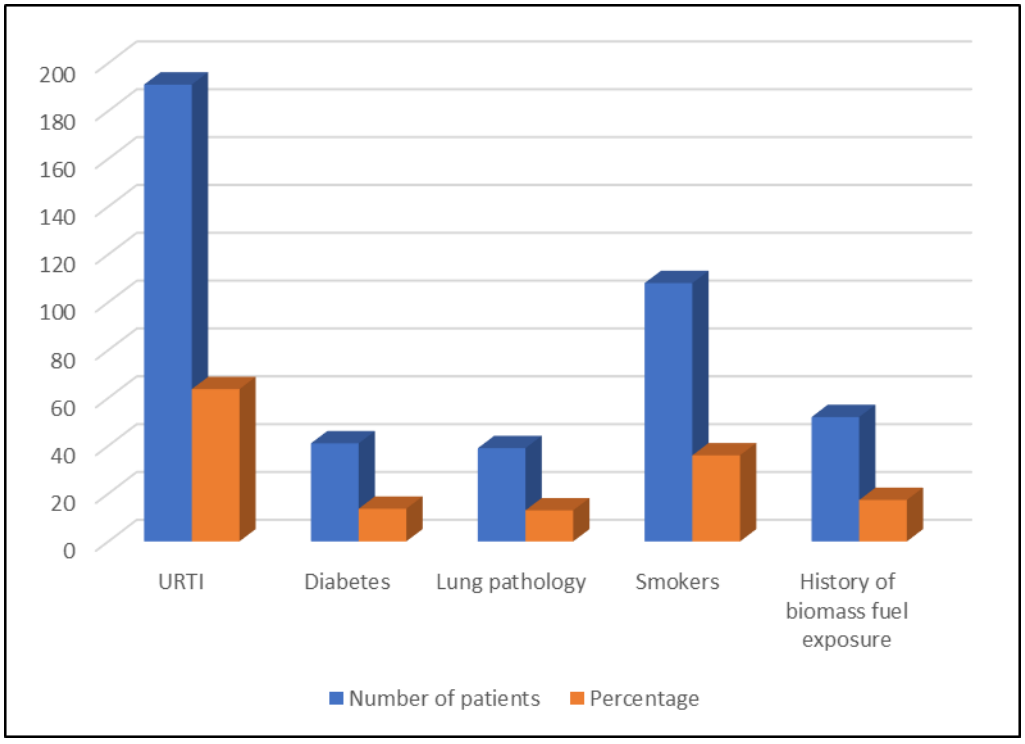


13.67 percent of the patients were diabetic while 12.67 percent of the patients were hypertensive. Chronic kidney disease was present in 6.67 percent of the patients while coronary artery disease was present in 6 percent of the patients. Obstructive airway disease (Asthma/COPD) was present in 13 percent of the patients while past history of TB was seen in 10.33 percent of the patients.

Table 8: Risk factors

Risk factors	Number of patients	Percentage
URTI	191	63.67
Diabetes	41	13.67
Lung pathology	39	13
Smokers	108	36
History of biomass fuel exposure	52	17.33
Total	300	100

Figure 8: Risk factors

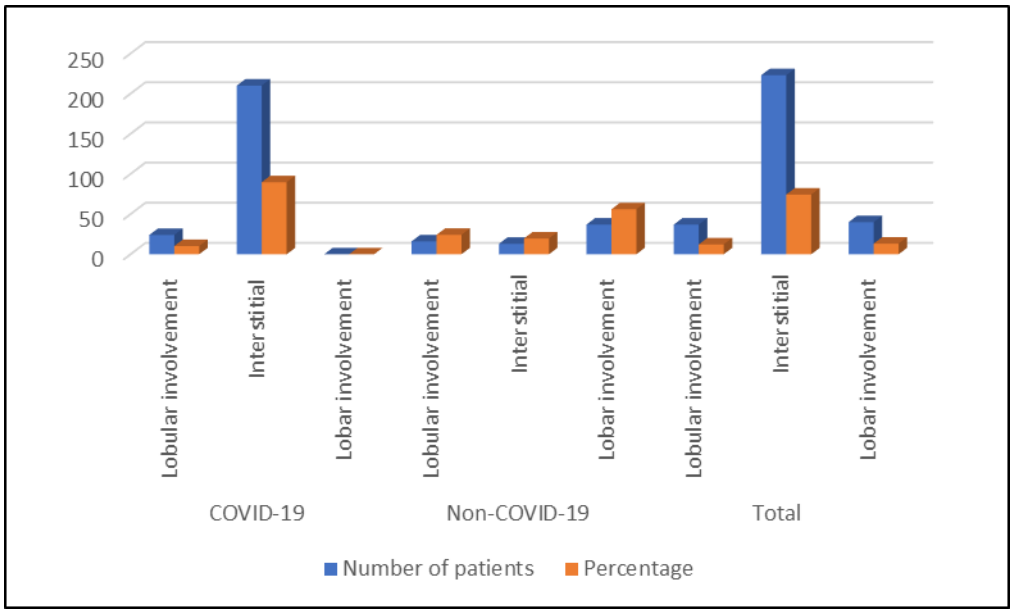


URTI and diabetes were risk factors for CAP in 63.67 and 13.67 percent of the patients while positive smoking history and history of biomass fuel exposure were seen in 36 percent and 17.33 percent of the patients respectively. History of lung pathology was seen in 13 percent of the patients.

Table 9: Distribution of patients according to chest X ray findings

Chest X ray findings		Number of patients	Percentage	p- value
COVID-19	Lobular involvement	24	10.26	0.000 (Significant)
	Interstitial	210	89.74	
	Lobar involvement	0	0	
Non-COVID-19	Lobular involvement	16	24.24	
	Interstitial	13	19.70	
	Lobar involvement	37	56.06	
Total	Lobular involvement	37	13.33	
	Interstitial	223	74.4	
	Lobar involvement	40	12.33	

Figure 9: Distribution of patients according to chest X ray findings

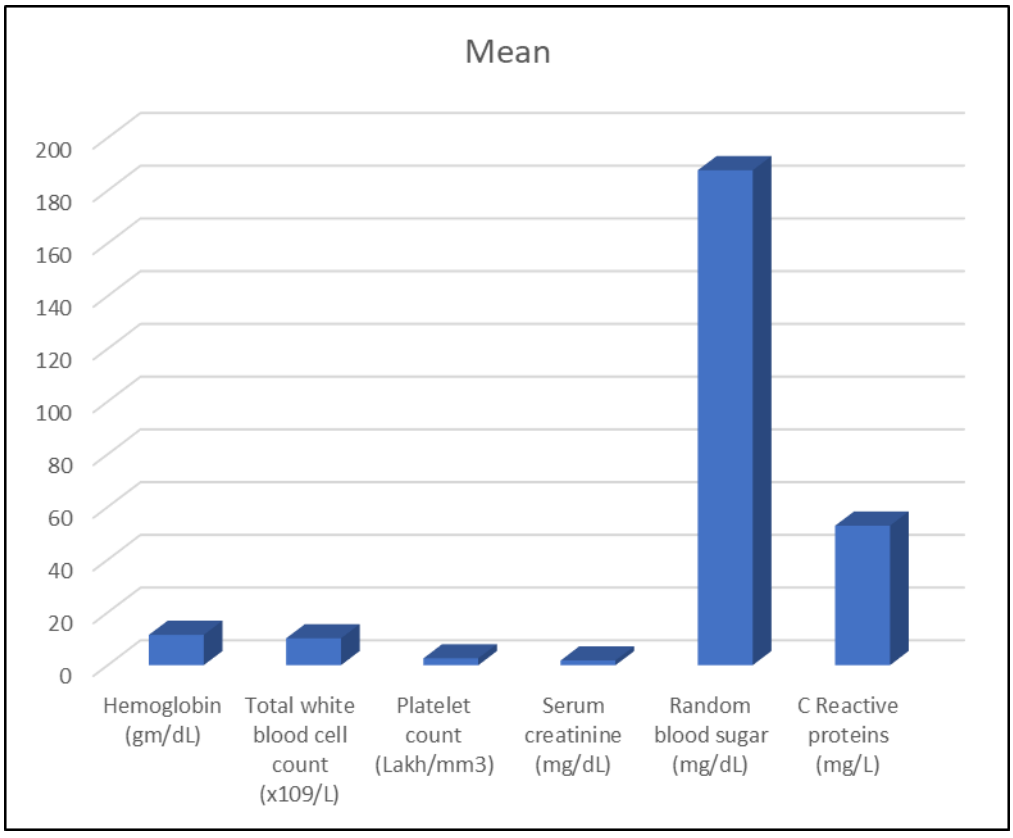


On chest X ray evaluation, interstitial findings were seen in 74.4 percent of the patients. Lobar involvement was seen in 12.33 percent of the patients while lobular involvement was seen in 13.33 percent of the patients. In patients with COVID-19 etiology and non-COVID-19 etiologies, interstitial involvement was seen in 89.74 percent and 19.7 percent of the patients respectively. Significant results were obtained while comparing the chest X ray findings among COVID-19 and Non-COVID-19 patients.

Table 10: Biochemical variables

Biochemical variables	Mean	SD
Hemoglobin (gm/dL)	11.5	1.7
Total white blood cell count ($x10^9$/L)	10.2	1.4
Platelet count (Lakh/mm^3)	2.6	0.8
Serum creatinine (mg/dL)	1.8	2.8
Random blood sugar (mg/dL)	187.7	5.7
C Reactive proteins (mg/L)	52.9	6.1

Figure 10: Biochemical variables

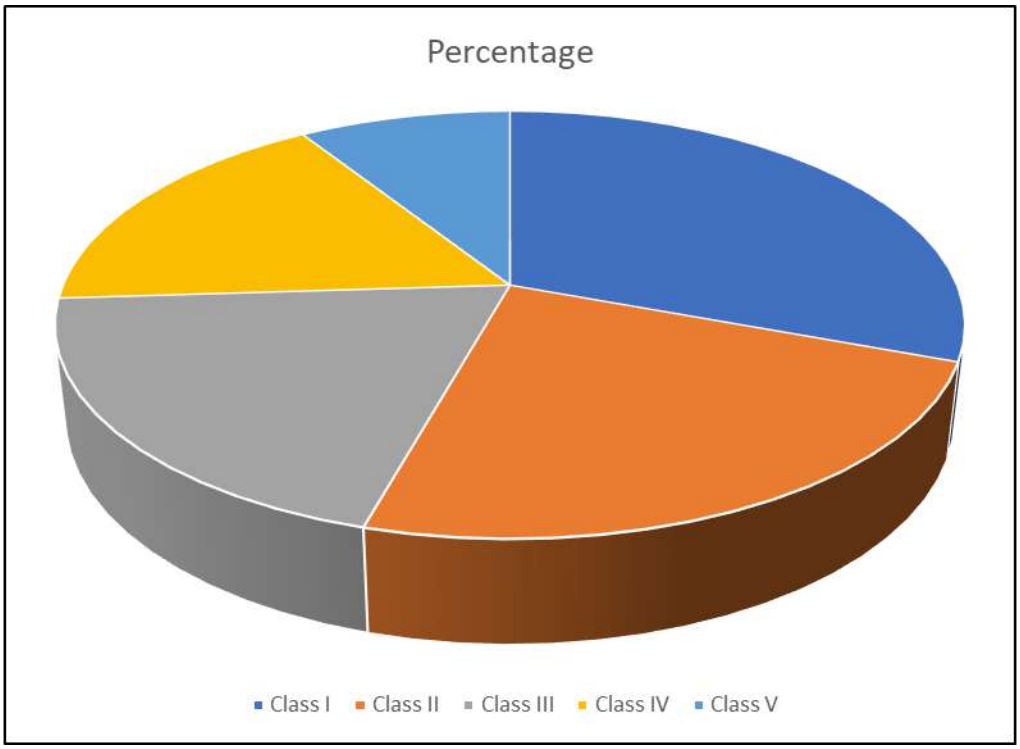


Mean hemoglobin levels and total WBC count was 11.5 gm/dL and 10.2 x 10^9 cells/ L respectively. Total platelet count, serum creatinine levels, random blood sugar and C Reactive proteins levels were found to be 2.6 lakh/ mm^3, 1.8 mg/dL, 187.7 mg/dL and 52.9 mg/L respectively.

Table 11: PSI Class

PSI Class	Number of patients	Percentage
Class I	92	30.67
Class II	71	23.67
Class III	59	19.67
Class IV	51	17
Class V	27	9
Total	300	100

Figure 11: PSI Class

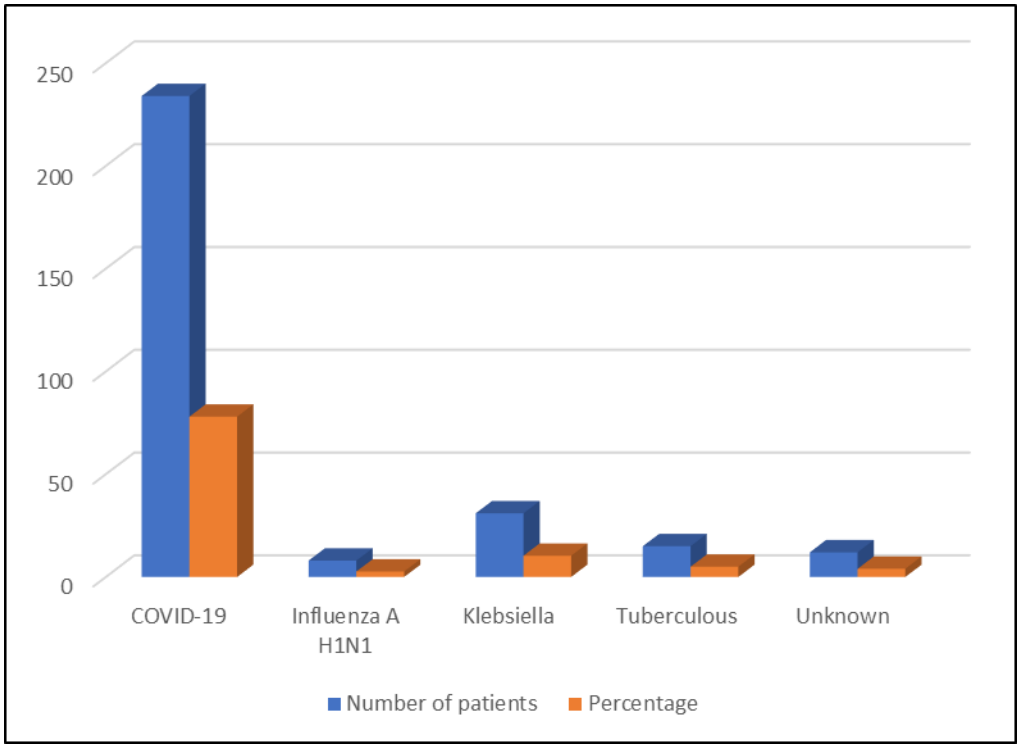


Out of 300 patients with CAP, 30.67 percent and 23.67 percent of the patients were of class I and class II respectively. 19.67 percent, 17 percent and 9 percent of the patients were of class III, class IV and class V respectively.

Table 12: Distribution of patients according to etiology of CAP

Etiology	Number of patients	Percentage
COVID-19	234	78
Influenza A H1N1	8	2.67
Klebsiella	31	10.33
Tuberculous	15	5
Unknown	12	4
Total	300	100

Figure 12: Distribution of patients according to etiology of CAP

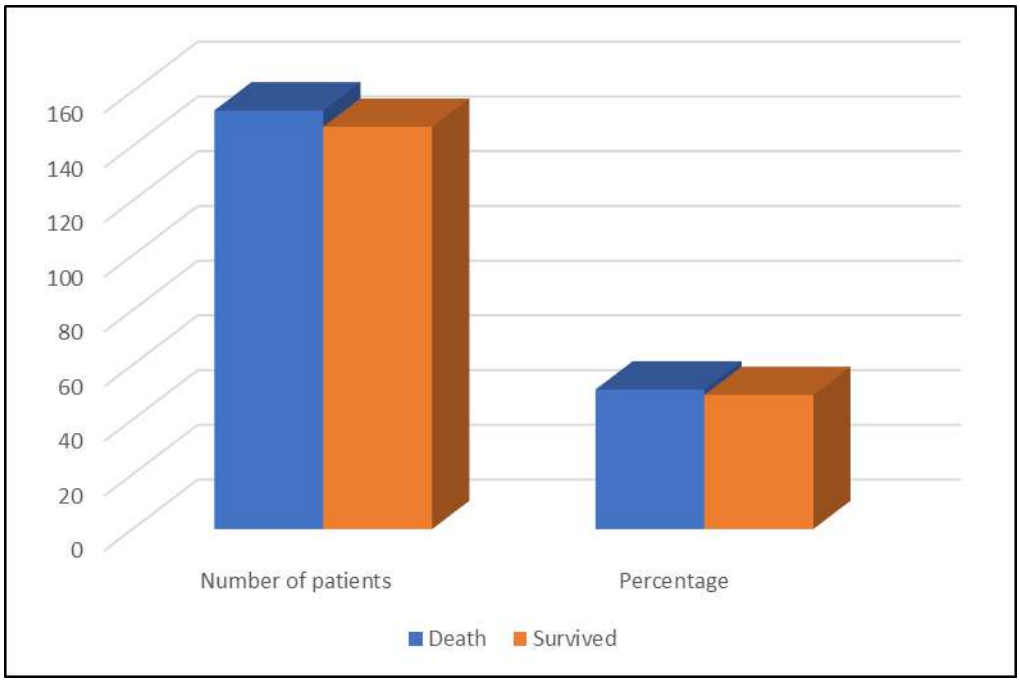


Among 78 percent of the patients, the etiology was COVID 19. In 10.33 percent of the patients, CAP was of bacteriological etiology (Klebsiella) while 2.67 percent of the patients with CAP had viral etiology (Influenza A H1N1). Tuberculous etiology was seen in 5 percent of the patients while etiology was unknown in 4 percent of the patients.

Table 13: Overall outcome of patients with CAP

Outcome	Number of patients	Percentage
Death	153	51
Survived	147	49
Total	300	100

Figure 13: Overall outcome of patients with CAP

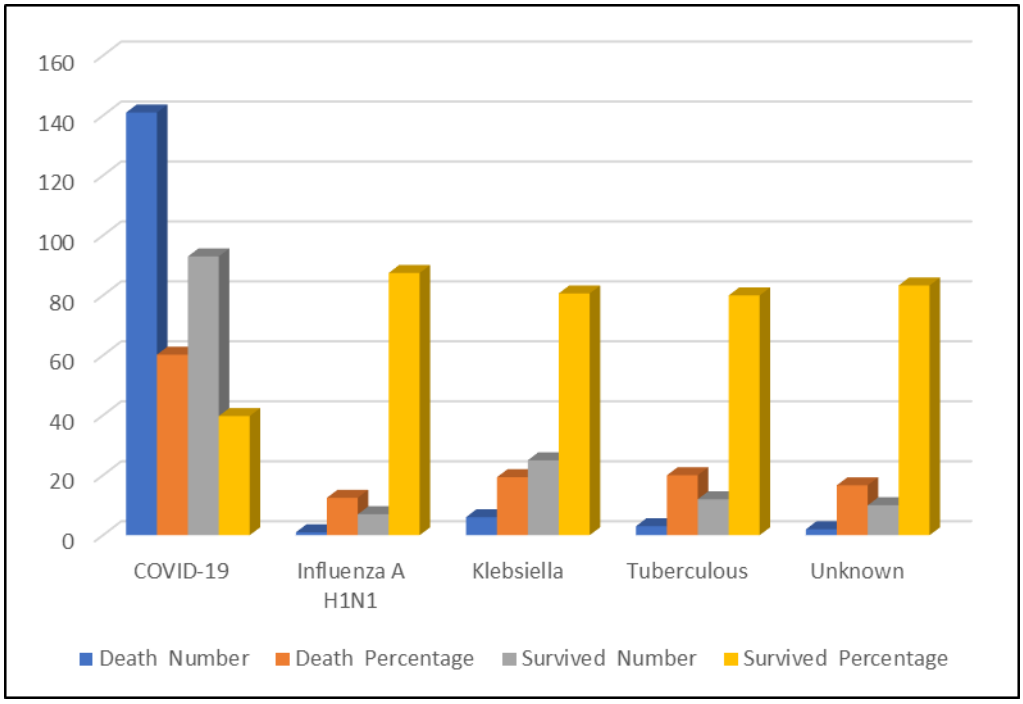


Overall, mortality was seen in 51 percent of the patients.

Table 14: Correlation of Outcome with etiology of CAP

Etiology	Death		Survived		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
COVID-19	141	60.25	93	39.75	234	100
Influenza A H1N1	1	12.5	7	87.5	8	100
Klebsiella	6	19.35	25	80.65	31	100
Tuberculous	3	20	12	80	15	100
Unknown	2	16.67	10	83.33	12	100
Total	153	51	147	49	300	100
p- value	0.001 (Significant)					

Figure 14: Correlation of Outcome with etiology of CAP

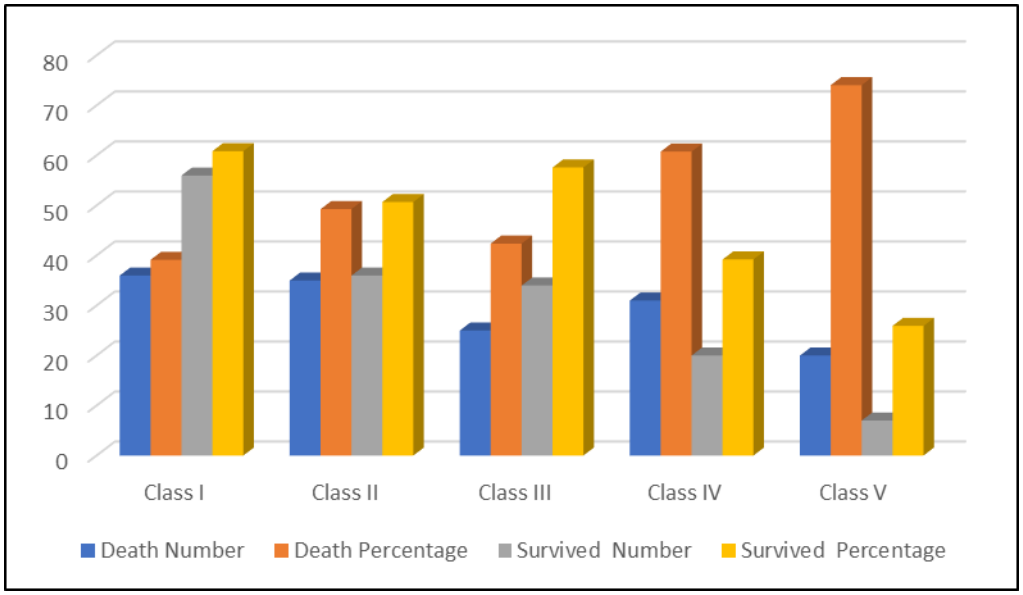


Mortality rate among patients with COVID-19 etiology was significant higher (60.25 percent) in comparison to patients with other etiologies (Influenza A H1N1 etiology: 12.5 percent, Klebsiella etiology: 19.35 percent, Tuberculous etiology: 20 percent, and Unknown etiology: 16.67 percent) (p- value < 0.05).

Table 15: PSI Class and outcome

PSI Class	Death		Survived		Total	
	Number	Percentage	Number	Percentage	Number	Percentage
Class I	36	39.13	56	60.87	92	100
Class II	35	49.29	36	50.71	71	100
Class III	25	42.39	34	57.61	59	100
Class IV	31	60.78	20	39.22	51	100
Class V	20	74.07	7	25.93	27	100
Total	147	49	153	51	300	100
p- value	0.001 (Significant)					

Figure 15: PSI Class and outcome

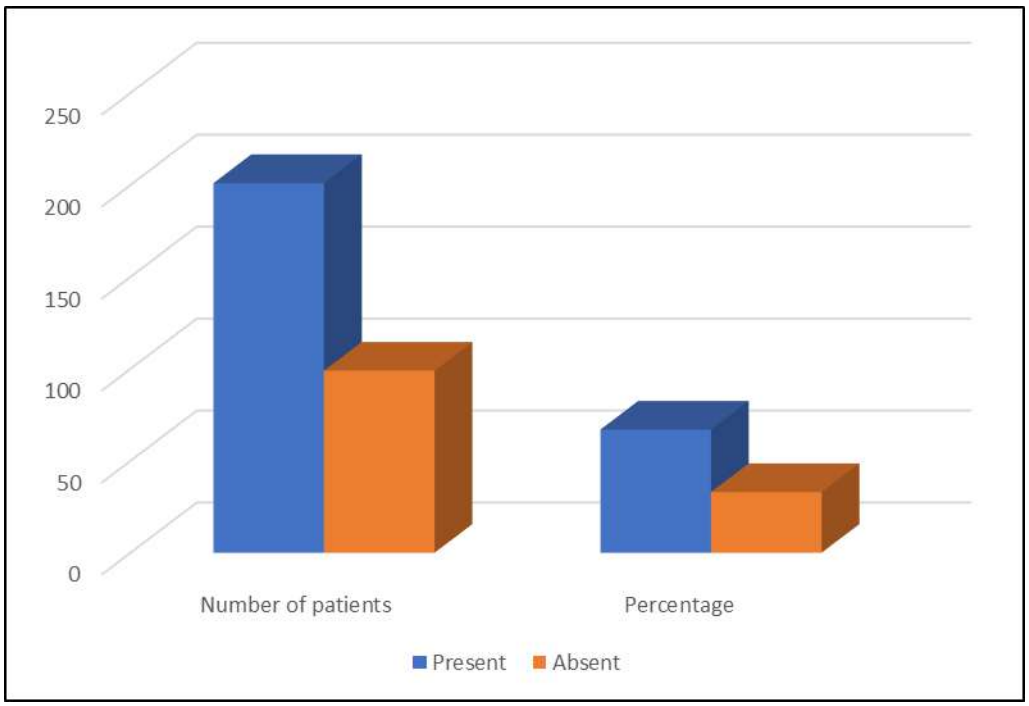


Mortality was significantly higher among patients of PSI Class V (74.07 percent) in comparison to patients of Class IV (60.78 percent), Class III (42.39 percent), Class II (49.39 percent) and Class I (39.13 percent). While assessing the correlation of PSI Class with outcome, significant results were obtained.

Table 16: Distribution of patients according to ICU admission

ICU admission	Number of patients	Percentage
Present	201	67
Absent	99	33
Total	300	100

Graph 16: Distribution of patients according to ICU admission

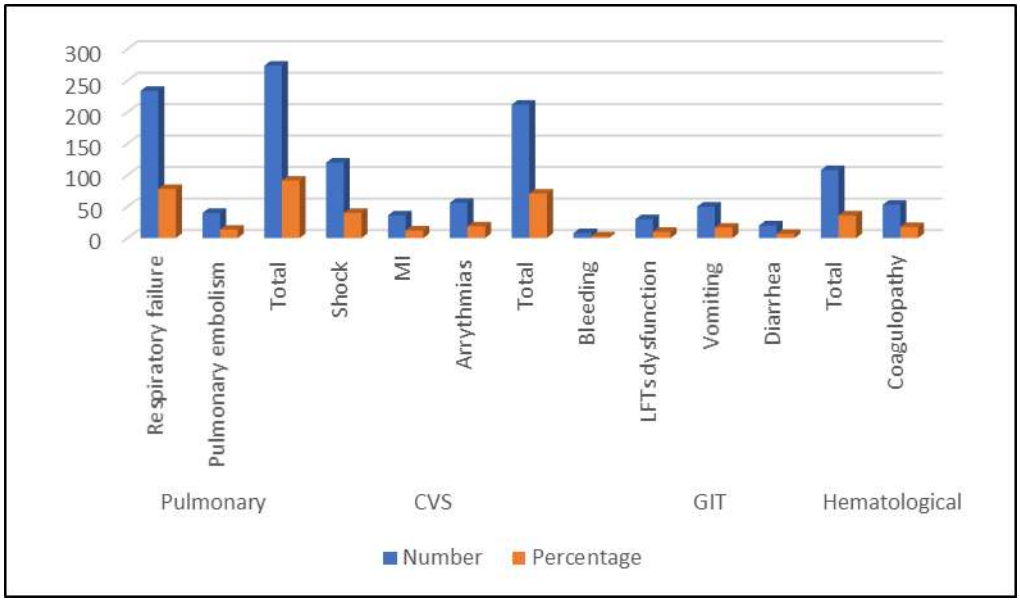


Out of 300 patients with CAP, ICU admissions were seen in 67 percent of the patients.

Table 17: Complications

Complications		Number	Percentage
Pulmonary	Respiratory failure	234	78
	Pulmonary embolism	40	13.33
	Total	274	91.33
CVS	Shock	120	40
	MI	36	12
	Arrhythmias	56	18.67
	Total	212	70.67
GIT	Bleeding	8	2.67
	LFTs dysfunction	30	10
	Vomiting	50	16.67
	Diarrhea	20	6.67
	Total	108	36
Hematological	Coagulopathy	53	17.67

Figure 17: Complications



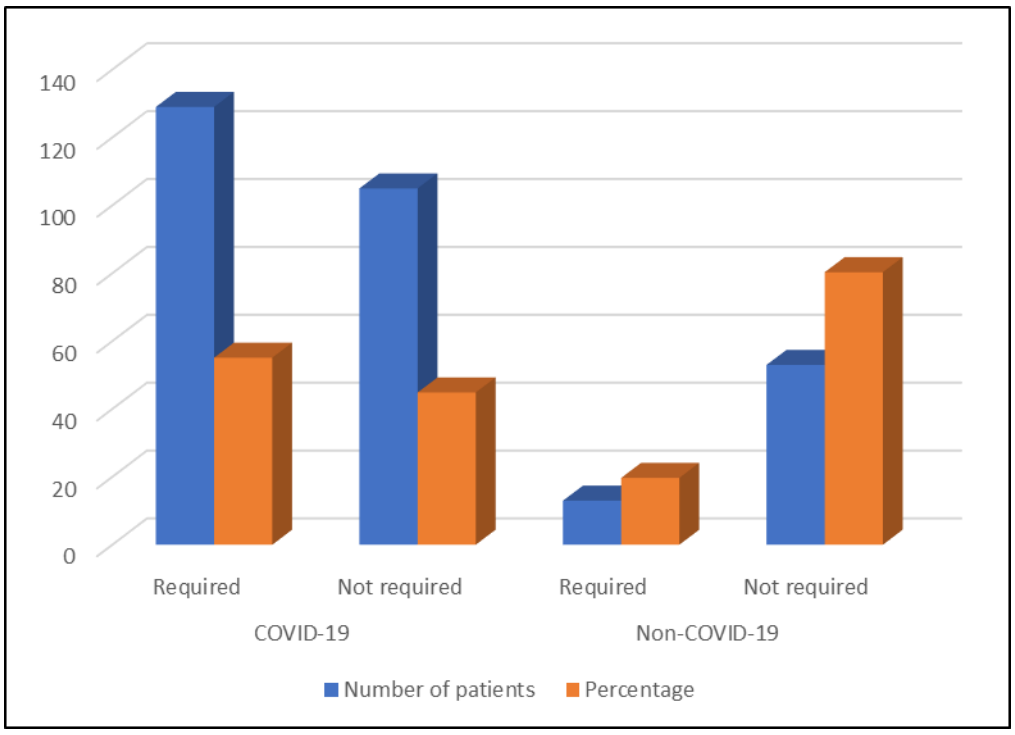
Pulmonary complications were seen in 91.33 percent of the patients. Among them, respiratory failure and pulmonary embolism were seen in 78 percent and 13.33 percent of the patients respectively. CVS complications were seen in 70.67 percent of the patients. Among them, shock, MI and arrythmias were seen in 40 percent, 12 percent and 18.67 percent of the patients respectively. GIT complications were seen in 36 percent of the patients among which bleeding, LFT's dysfunction, vomiting and diarrhea was seen in 2.67 percent, 10 percent, 16.67 percent and 6.67 percent of the patients respectively. Among hematological complications, coagulopathy was seen in 17.67 percent of the patients.

Table 18: Mechanical ventilation

Mechanical ventilation		Number of patients	Percentage	p- value
COVID-19	Required	129	55.12	0.012*
	Not required	105	44.88	
Non-COVID-19	Required	13	19.69	
	Not required	53	80.31	
Total	Required	142	47.33	
	Not required	158	52.67	

*: Significant

Graph18: Mechanical ventilation

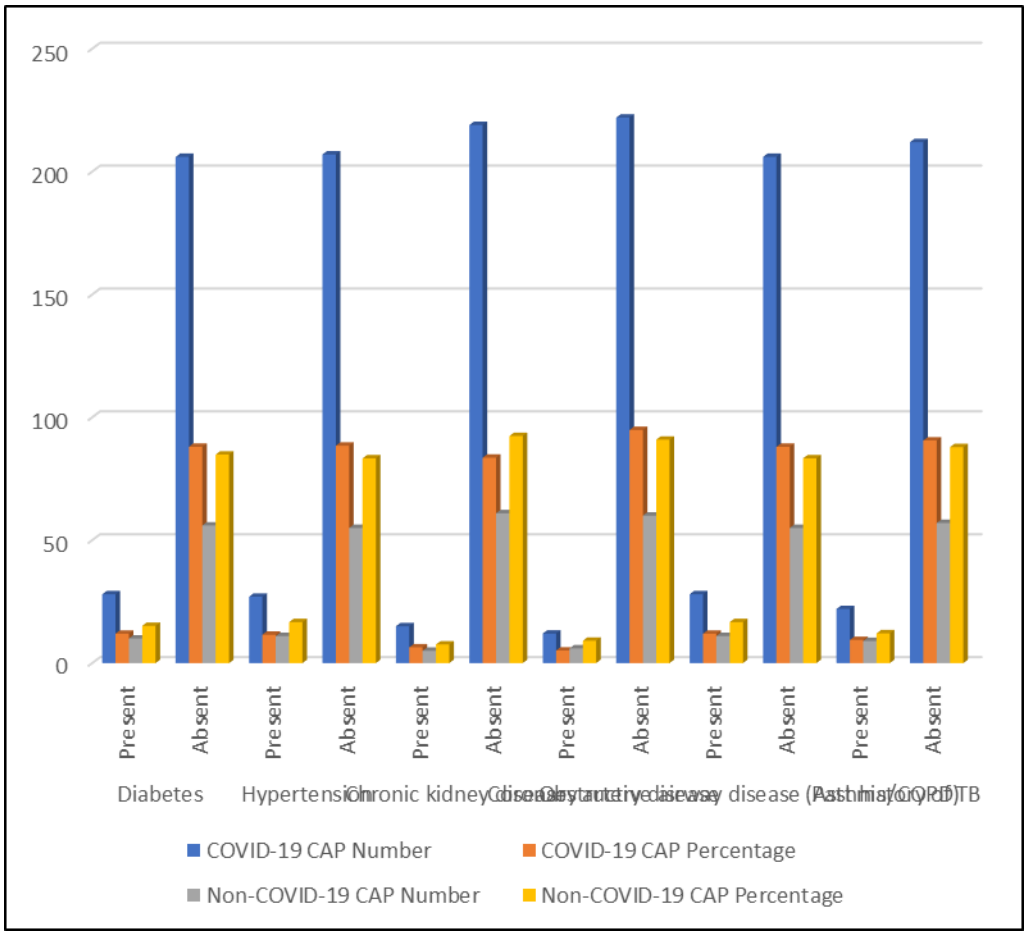


Overall, mechanical ventilation was required in 47.33 percent of the patients. Among patients with COVID-19 etiology, significantly higher proportion of patients required mechanical ventilation (55.12 percent) in comparison to patients with non-COVID-19 etiology (19.69 percent); the results of which were found to be statistically significant.

Table 19: Correlation of co-morbidities and COVID-19 status

Co-morbidities		COVID-19 CAP		Non-COVID-19 CAP		p- value
		Number	Percentage	Number	Percentage	
Diabetes	Present	28	11.96	10	15.15	0.284
	Absent	206	88.04	56	84.85	
Hypertension	Present	27	11.53	11	16.67	0.627
	Absent	207	88.47	55	83.33	
Chronic kidney disease	Present	15	6.42	5	7.58	0.117
	Absent	219	83.58	61	92.42	
Coronary artery disease	Present	12	5.12	6	9.09	0.433
	Absent	222	94.88	60	90.91	
Obstructive airway disease (Asthma / COPD)	Present	28	11.96	11	16.67	0.721
	Absent	206	88.04	55	83.33	
Past history of TB	Present	22	9.41	9	12.12	0.451
	Absent	212	90.59	57	87.88	

Figure 19: Correlation of co-morbidities and COVID-19 status

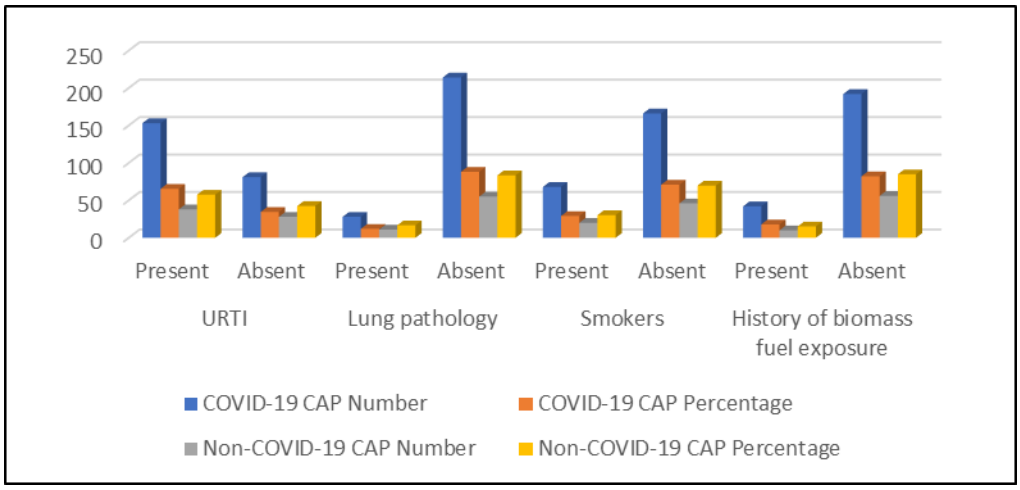


11.53 percent of COVID-19 etiology patients and 16.67 percent of the non-COVID-19 patients were hypertensive (p-value > 0.05). 11.96 percent of COVID-19 etiology patients and 15.15 percent of the non-COVID-19 patients were diabetic (p-value > 0.05). 6.42 percent of COVID-19 etiology patients and 7.58 percent of the non-COVID-19 patients had positive history of CKD (p-value > 0.05). 5.12 percent of COVID-19 etiology patients and 9.09 percent of the non-COVID-19 patients had positive history of CAD (p-value > 0.05). 11.96 percent of COVID-19 etiology patients and 16.67 percent of the non-COVID-19 patients had positive history of obstructive airway disease (p-value > 0.05).9.41 percent of COVID-19 etiology patients and 12.12 percent of the non-COVID-19 patients had positive past history of TB.

Table 20: Correlation of risk factors of CAP and COVID-19 status

Risk factors of CAP		COVID-19 CAP		Non-COVID-19 CAP		p-value
		Number	Percentage	Number	Percentage	
URTI	Present	153	65.38	38	57.57	0.441
	Absent	81	34.61	28	42.43	
Lung pathology	Present	28	11.96	11	16.67	0.947
	Absent	214	88.04	55	83.33	
Smokers	Present	68	29.1	20	30.3	0.845
	Absent	166	70.9	46	69.7	
History of biomass fuel exposure	Present	42	17.9	10	15.2	0.596
	Absent	192	82.1	56	84.8	

Figure 20: Correlation of risk factors of CAP and COVID-19 status



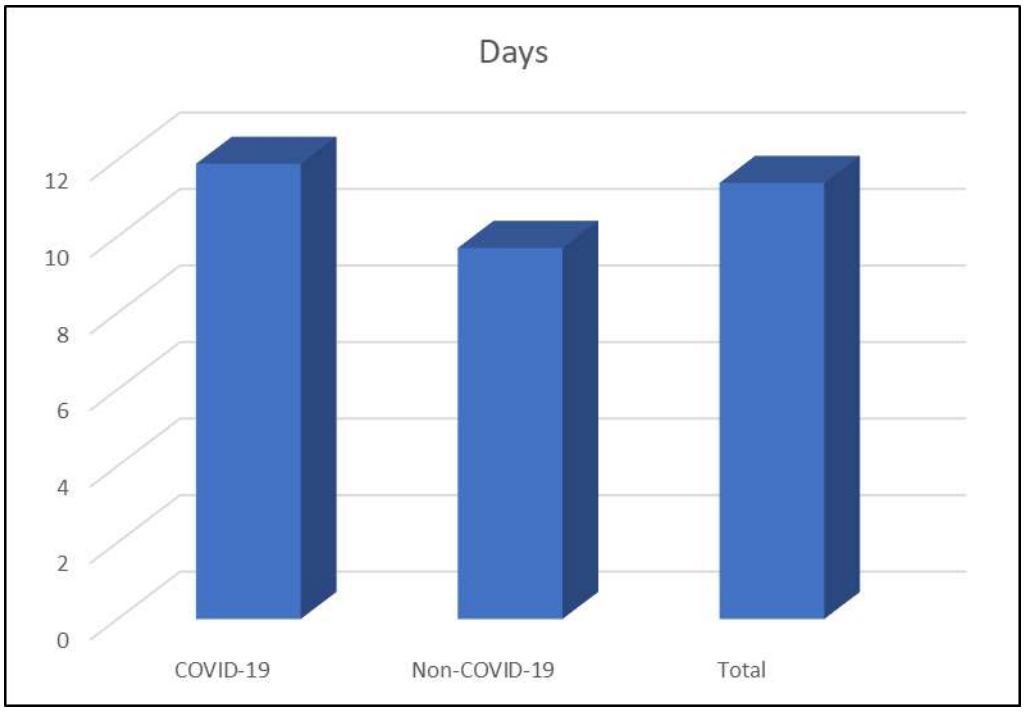
65.38 percent of the COVID-19 CAP patients and 57.57 percent of non-COVID-19 CAP patients had pressence of URTI as risk factor of CAP.11.96 percent of the COVID-19 CAP patients and 16.67 percent of non-COVID-19 CAP patients had presence of lung pathology as risk factor of CAP. 29.1 percent of the COVID-19 CAP patients and 30.3 percent of non-COVID-19 CAP patients had positive smoking habit. 17.9 percent of the COVID-19 CAP patients and 15.2 percent of non-COVID-19 CAP patients had positive history of biomass fuel exposure.

Table 21: Hospital stay (days)

Hospital stay		Days	p- value
COVID-19	Mean	11.9	0.037*
	SD	4.1	
Non-COVID-19	Mean	9.7	
	SD	2.9	
Total	Mean	11.4	
	SD	3.9	

*: Significant

Figure 21: Hospital stay (days)



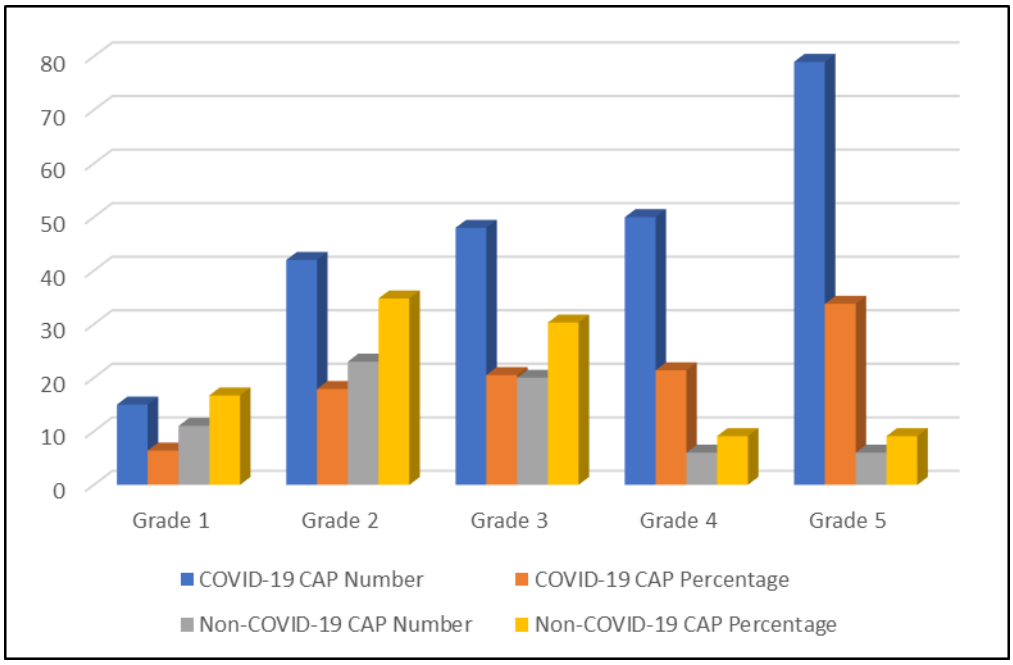
Overall, mean hospital stay duration was 11.4 days. Among patients with COVID-19 etiology, significantly higher hospital stay duration was present (11.9 days) in comparison with non-COVID-19 etiology (9.7 days); the results of which were found to be statistically significant.

Table 22: Correlation of PSI Grading and COVID-19 status

PSI Grading	COVID-19 CAP		Non-COVID-19 CAP		p-value
	Number	Percentage	Number	Percentage	
Grade 1	15	6.4	11	16.7	0.001*
Grade 2	42	17.9	23	34.8	
Grade 3	48	20.5	20	30.3	
Grade 4	50	21.4	6	9.1	
Grade 5	79	33.8	6	9.1	
Total	234	100	66	100	

*: Significant

Figure 22: Correlation of PSI Grading and COVID-19 status



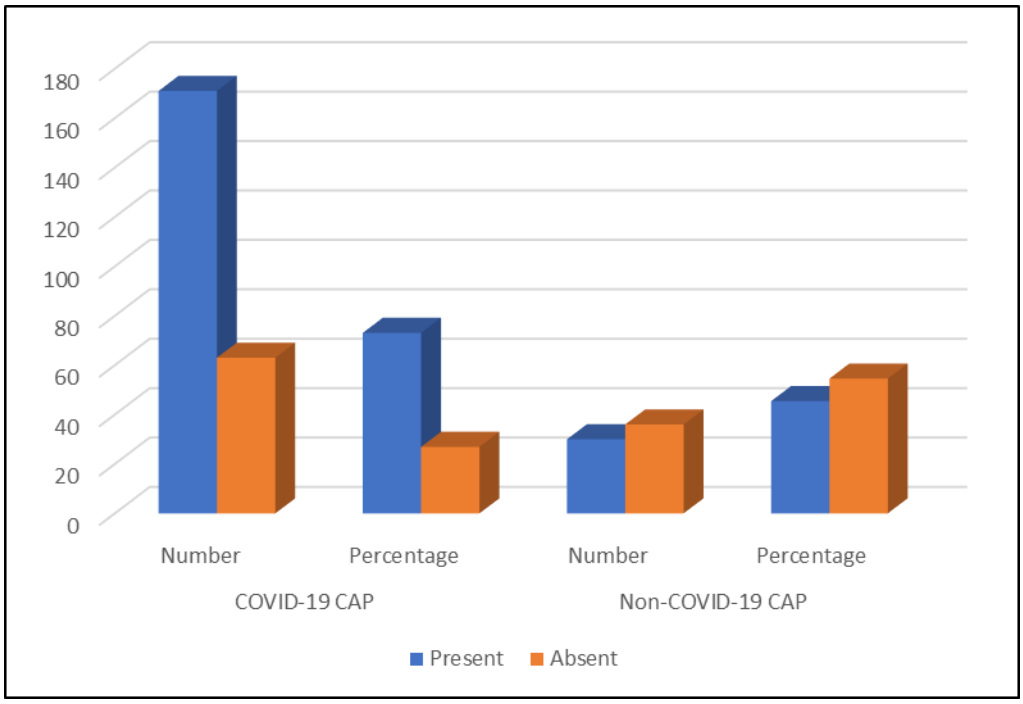
Significantly higher proportion of patients of COVID-19 etiology were of PSI grading four and five while among patients with Non-COVID-19 etiology, majority of patients were of PSI grading two and three (p-value < 0.05).

Table 23: Correlation of ICU admission and COVID-19 status

ICU admission	COVID-19 CAP		Non-COVID-19 CAP		p-value
	Number	Percentage	Number	Percentage	
Present	171	73.08	30	45.45	0.001*
Absent	63	26.92	36	54.55	
Total	234	100	66	100	

*: Significant

Figure 23: Correlation of ICU admission and COVID-19 status

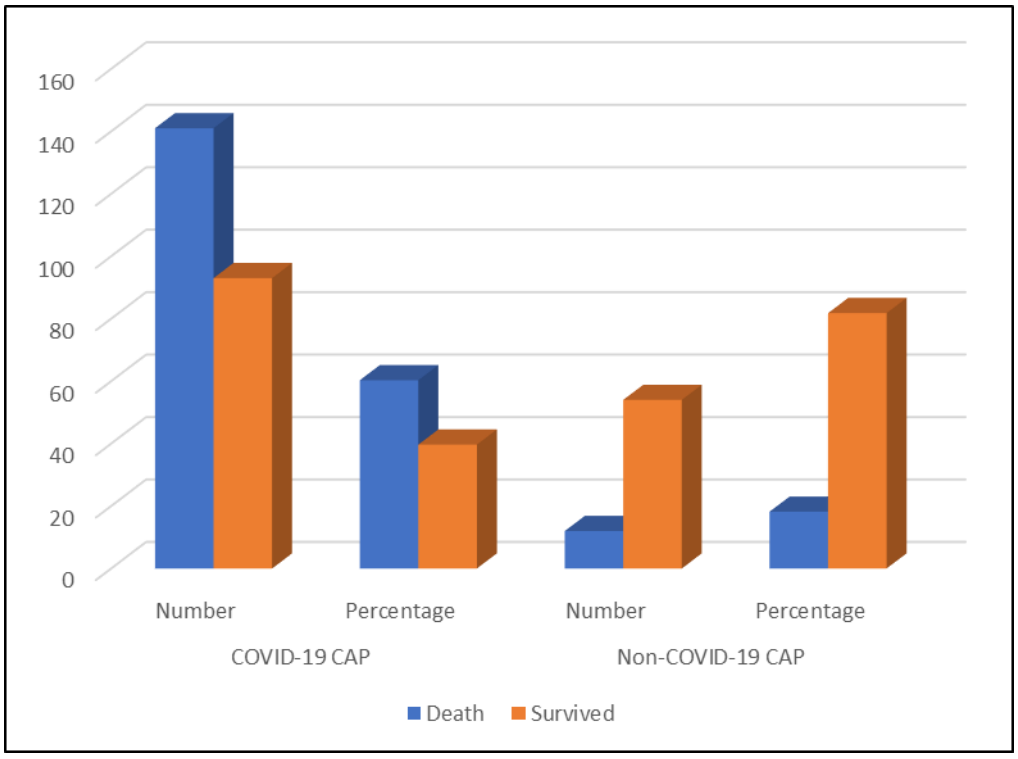


Among COVID-19 CAP patients, ICU admission was required in 73.08 percent of the patients while among Non-COVID-19 CAP patients, ICU admission was needed in 45.45 percent of the patients (p-value < 0.05).

Table 24: Correlation of outcome and COVID-19 status

Outcome	COVID-19 CAP		Non-COVID-19 CAP		p-value
	Number	Percentage	Number	Percentage	
Death	141	60.25	12	18.2	0.001*
Survived	93	39.75	54	81.8	
Total	234	100	66	100	

Figure 24: Correlation of outcome and COVID-19 status

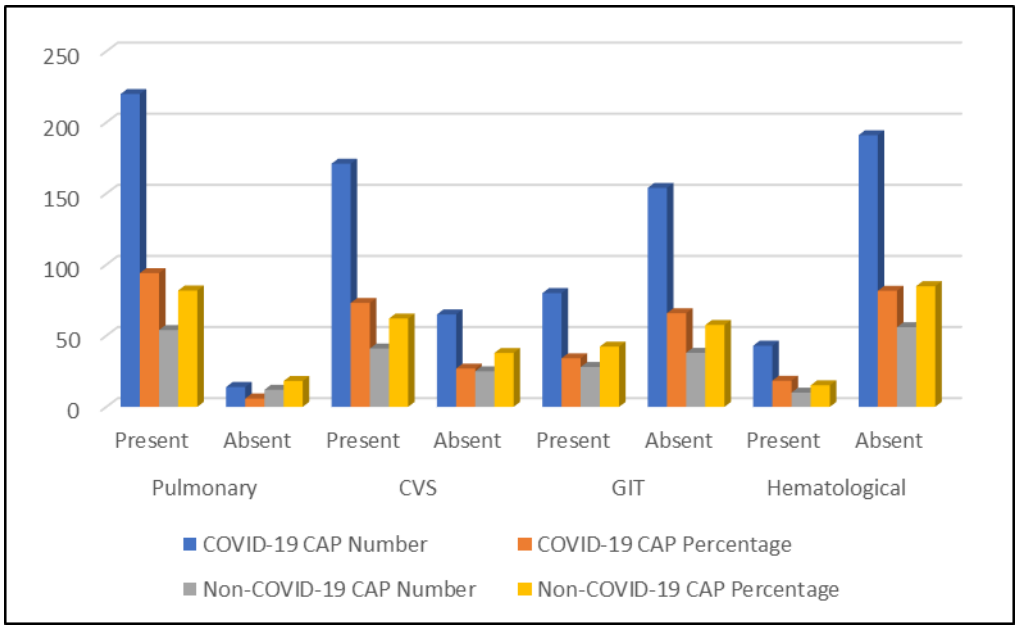


Mortality rate was 60.25 percent among patients with COVID-19 etiology while it was 18.2 percent among patients with non-COVID etiology. On comparing the results were found to be significant statistically.

Table 25: Correlation of complications and COVID-19 status

Complications		COVID-19 CAP		Non-COVID-19 CAP		p-value
		Number	Percentage	Number	Percentage	
Pulmonary	Present	220	94.02	54	81.81	0.761
	Absent	14	5.88	12	18.19	
CVS	Present	171	73.08	41	62.12	0.918
	Absent	65	26.92	25	37.88	
GIT	Present	80	34.18	28	42.42	0.233
	Absent	154	65.82	38	57.58	
Hematological	Present	43	18.38	10	15.15	0.499
	Absent	191	81.62	56	84.85	

Figure 25: Correlation of complications and COVID-19 status



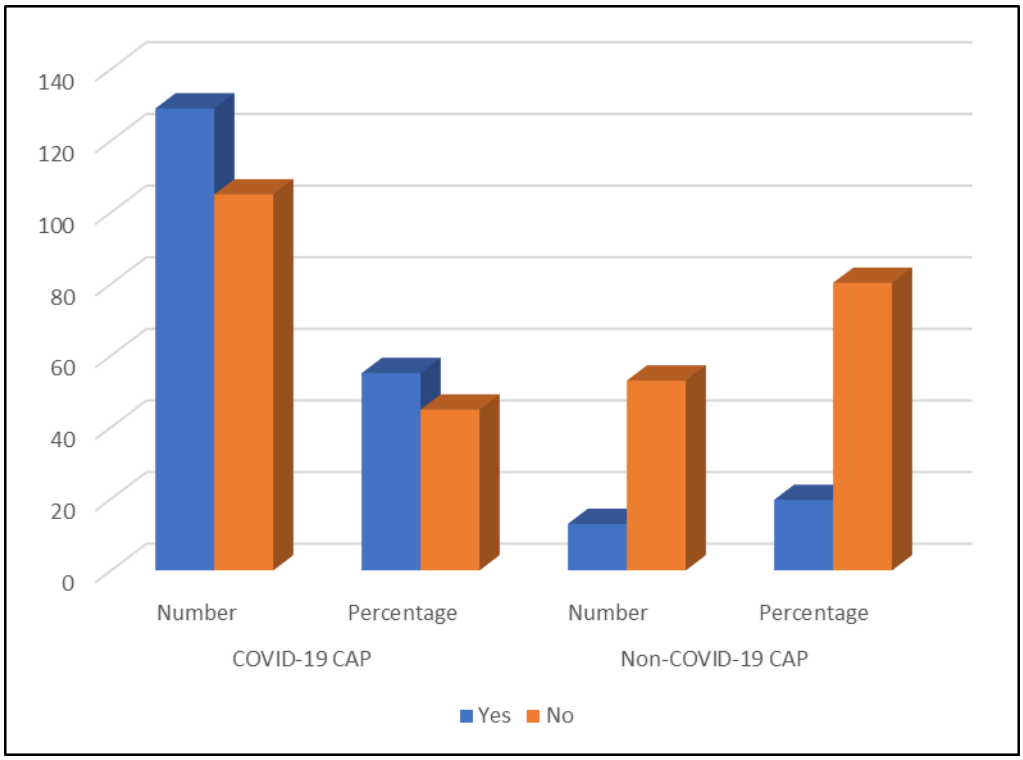
Pulmonary complications were seen in 94.02 percent of the patients with COVID-19 etiology and in 81.81 percent of the patents with non-COVID-19 etiology. CVS complications were seen in 73.08 percent of the patients with COVID-19 etiology and in 62.12 percent of the patents with non-COVID-19 etiology. GIT complications were seen in 34.18 percent of the patients with COVID-19 etiology and in 42.42 percent of the patents with non-COVID-19 etiology.Hematological complications were seen in 18.38 percent of the patients with COVID-19 etiology and in 15.15 percent of the patents with non-COVID-19 etiology.

Table 26: Correlation of Mechanical ventilation and COVID-19 status

Mechanical ventilation	COVID-19 CAP		Non-COVID-19 CAP		p-value
	Number	Percentage	Number	Percentage	
Yes	129	55.1	13	19.7	0.001*
No	105	44.9	53	80.3	
Total	234	100	66	100	

*: Significant

Figure 26: Correlation of Mechanical ventilation and COVID-19 status



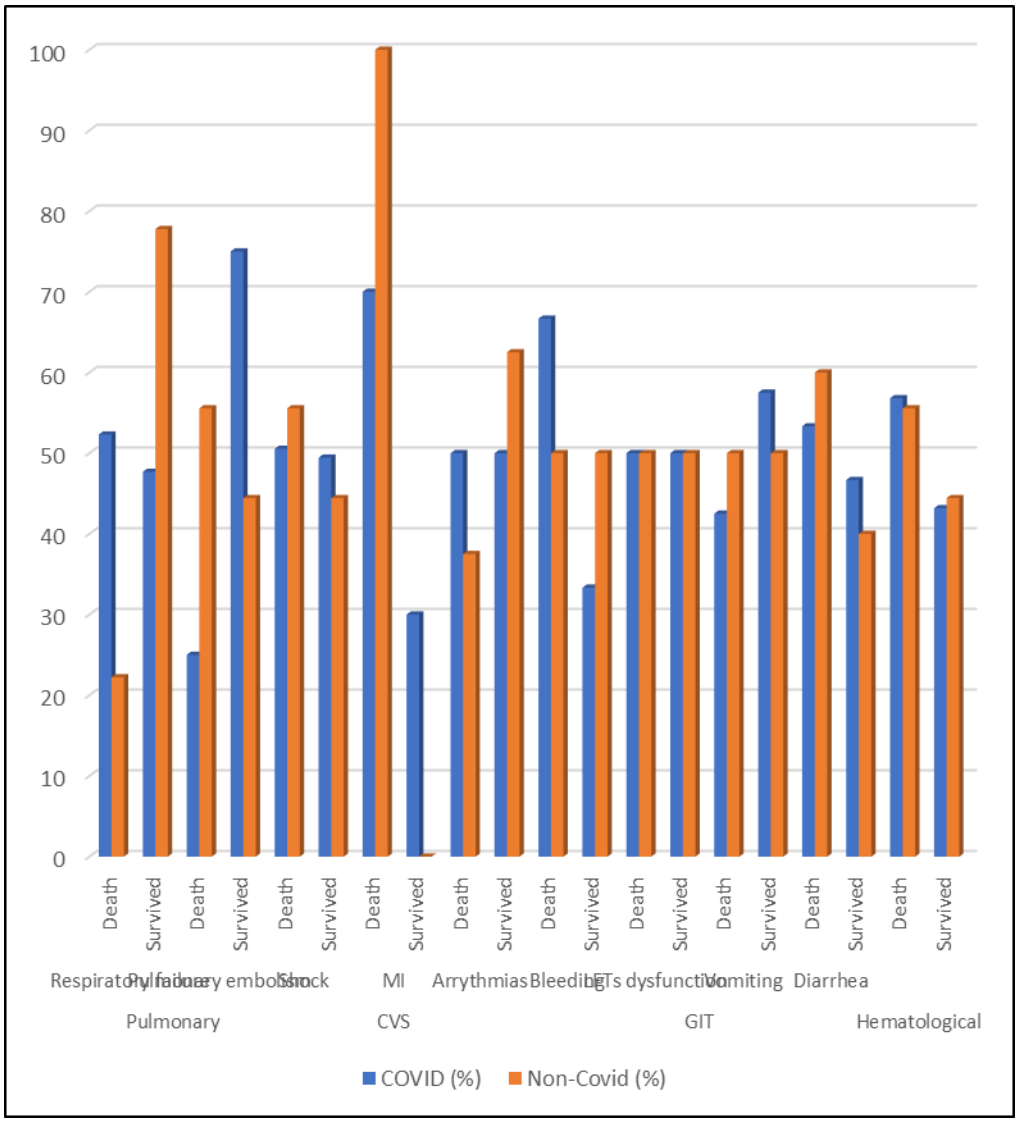
Significantly higher proportion of patients of COVID-19 etiology were of PSI grading four and five while among patients with Non-COVID-19 etiology, majority of patients were of PSI grading two and three (p-value < 0.05).

Table 27: Correlation of complications, mortality and COVID-19 status

Complications			COVID-19 CAP		Non-COVID-19 CAP		p-value
			Number	Percentage	Number	Percentage	
Pulmonary	Respiratory failure	Death	113	52.31	4	22.22	0.014*
		Survived	103	47.69	14	77.78	
	Pulmonary embolism	Death	1	25	20	55.56	0.24
		Survived	3	75	16	44.44	
CVS	Shock	Death	47	50.54	15	55.56	0.64
		Survived	46	49.46	12	44.44	
	MI	Death	21	70	6	100	0.12
		Survived	9	30	0	0	
	Arrhythmia	Death	24	50	3	37.5	0.51
		Survived	24	50	5	62.5	
GIT	Bleeding	Death	4	66.67	1	50	0.67
		Survived	2	33.33	1	50	
	LFTs dysfunction	Death	11	50	4	50	1
		Survived	11	50	4	50	
	Vomiting	Death	17	42.5	5	50	0.67
		Survived	23	57.5	5	50	
	Diarrhea	Death	8	53.33	3	60	0.47
		Survived	7	46.67	2	40	
Hematological		Death	25	56.82	5	55.56	0.36
		Survived	19	43.18	4	44.44	

*: Significant

Figure 27: Correlation of complications, mortality and COVID-19 status



While comparing the correlation of morality with complications among COVID-19 CAP and non-COVID-19 CAP patients, non-significant results were obtained. However; while comparing in outcome of respiratory failure among COVID-19 CAP and non-COVID-19 CAP patients, mortality among patients with respiratory failure among COVID-19 CAP group was significantly higher (52.31 percent) in comparison to non-COVID-19 CAP group (22.22 percent) (p-value < 0.05).

Table 28: Predictors of mortality

Variables		Death (n=153)		Survived (n=147)		Chi-square value	p-value
		n	%	n	%		
Gender	Female	46	30.1%	52	35.4%	0.961	0.327
	Male	107	69.9%	95	64.6%		
Smoking	Absent	109	71.2%	103	70.1%	0.05	0.823
	Present	44	28.8%	44	29.9%		
Biofuel exposure	Absent	128	83.7%	120	81.6%	0.215	0.643
	Present	25	16.3%	27	18.4%		
Cough	Absent	0	0.0%	5	3.4%	5.292	0.021*
	Present	153	100.0%	142	96.6%		
Sputum	Absent	5	3.3%	7	4.8%	0.436	0.509
	Present	148	96.7%	140	95.2%		
Fever	Absent	0	0.0%	3	2.0%	3.154	0.116
	Present	153	100.0%	144	98.0%		
Shortness of breath	Absent	33	21.6%	29	19.7%	0.155	0.694
	Present	120	78.4%	118	80.3%		
chest pain	absent	83	54.2%	99	67.3%	5.390	0.020*
	Present	70	45.8%	48	32.7%		
Haemoptysis	absent	131	85.6%	128	87.1%	0.134	0.714
	Present	22	14.4%	19	12.9%		
Radiologic	Interstitial	111	72.5%	112	76.2%	0.528	0.768
	Lobar	20	13.1%	17	11.6%		
	Lobular	22	14.4%	18	12.2%		
Duration of illness	Less than 2 wks	48	31.4%	67	45.6%	11.417	0.003*
	2 to 4 wks	77	50.3%	46	31.3%		
	More than 4 wks	28	18.3%	34	23.1%		
Mechanical ventilation	No	42	27.5%	116	78.9%	79.641	0.001*
	Yes	111	72.5%	31	21.1%		

PSI Grading	1	0	0.0%	26	17.7%	189.466	0.001*
	2	1	0.7%	64	43.5%		
	3	24	15.7%	44	29.9%		
	4	46	30.1%	10	6.8%		
	5	82	53.6%	3	2.0%		
ICU admission	Absent	48	31.4%	51	34.7%	0.374	0.541
	Present	105	68.6%	96	65.3%		
Pulmonary Complications	Absent	19	12.4%	7	4.8%	5.794	0.055
	Pulmonary Embolism	21	13.7%	19	12.9%		
	Respiratory Failure	113	73.9%	121	82.3%		
CVS Complications	Absent	37	24.2%	51	34.7%	11.317	0.010*
	Arrhythmias	27	17.6%	29	19.7%		
	MI	27	17.6%	9	6.1%		
	SHOCK	62	40.5%	58	39.5%		
GIT Complications	Absent	99	64.7%	93	63.3%	2.989	0.56
	Bleeding	6	3.9%	2	1.4%		
	Diarrhoea	11	7.2%	9	6.1%		
	LFT dysfunction	15	9.8%	15	10.2%		
	Vomiting	22	14.4%	28	19.0%		
Haematological Complications	Absent	123	80.4%	124	84.4%	0.809	0.368
	Present	30	19.6%	23	15.6%		

*: Significant

After analyzing the predictors of morality, it was seen that cough, chest pain, duration of illness, COVID-19 etiology, need for mechanical ventilation, higher PSI grading and presence of cardiovascular complications were associated with significantly higher mortality.

DISCUSSION

Community-acquired pneumonia is a leading cause of hospitalization, mortality, and incurs significant health care costs. As disease presentation varies from a mild illness that can be managed as an outpatient to a severe illness requiring treatment in the intensive care unit (ICU), determining the appropriate level of care is important for improving outcomes in addition to early diagnosis and appropriate and timely treatment.[55, 65]

The pathogens causing community-acquired pneumonia can be classified as two types:- (1) Typical agents such as Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis, Staphylococcus aureus, Group A Streptococci, anaerobes, and gram-negative organisms and (2) Atypical agents including Legionella, Mycoplasma, Chlamydia pneumoniae, and C. psittaci. , Influenza, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and other respiratory viruses, have become increasingly detected as pathogens based on molecular detection methods. Worldwide, however S. pneumoniae and H. influenzae are the leading causes of acute bacterial pneumonia.[72, 73]

Studies have reported mortality rates of hospitalized older patients with CAP ranging from 9% to 33% and doubling as the age is increased from 65 to 69 years. The high incidence of CAP in the older adults is due to the physiological changes being associated with aging, the respiratory tract and immune system, and the presence of multiple comorbidities. It is important to remember that pneumonia in the elderly may present with few respiratory symptoms and instead may also manifest as geriatric syndrome such as delirium.[54, 56, 59]

Patients with coexisting illnesses such as chronic obstructive pulmonary disease (COPD), diabetes mellitus, renal failure, congestive heart failure, coronary artery disease (CAD), malignancy, chronic neurological disease, and chronic liver disease (CLD) have increased incidence of CAP with increased mortality. Decisions about empiric antibiotic therapy, which has a significant impact on these patients'

prognoses, must take into account differences in the epidemiology of the bacteria that cause CAP. Data about the microbiological causes of CAP in developing countries, like India, are scant and less and is hampered by the available data being old and limited by a small sample size and the detection methods having stayed confined to bacterial cultures.

Hence; under the light of above-mentioned data, the present study was undertaken for assessing the etiology, risk factors and outcome of hospitalized patients with community acquired pneumonia at our institute. A total of 300 patients with CAP were evaluated.

35.33 percent of the patients belonged to the age group of more than 60 years while 21.33 percent of the patients belonged to the age group of 51 to 60 years. 18.33 percent and 13.33 percent of the patients belonged to the age group of 41 to 50 years and 31 to 40 years respectively. Mean age of the patients was 52.85 years. Our results were in concordance with the results obtained by Yadav P et al who also reported similar findings. In their study, 48.2 percent of the patients with CAP belonged to the age group of more than 60 years.[75]In another study conducted by Patil SM et al, 44 percent of the patients belonged to the age group of more than 60 years.[76] In a similar study conducted by Roshni KS et al, 86.67 percent of the patients belonged to the age group of less than 60 years; mean age of the patients being 48.27 years.[77] Our results were also similar to the studies done by Shrestha R et al (51.3 years)[78], Bansal et al[79] (52.7 years) and Shah et al (53.68 years).[46]

While analyzing the CAP patients, it was seen that 67.33 percent of the patients were males while the remaining were females. Our results were in concordance with the results obtained by Yadav P et al who also reported similar findings. In their study, 64 percent of the patients were males while the remaining were females.[75] In another study conducted by Patil SM et al, 74 percent of the patients were males.[76]Jadhav S et al, in another study, reported that 88 percent of the patients were males.[80] In a similar study conducted by Roshni KS et al, 78.33 percent of the patients were males. This could be attributed

to the well-established fact that cigarette smoking and alcoholism, as well as underlying lung disease e.g. COPD predispose to pneumonia and are more common in males.[77]

In the present study, 36 percent of the patients were smokers while the remaining were non-smokers. Our results were in concordance with the results obtained by Yadav P et al who also reported similar findings. In their study, 42.4 percent of the patients were smokers while the remaining were non-smokers. Cigarette smoke is a complex mixture of chemicals which includes multiple genotoxic lung carcinogens. The classic mechanisms of carcinogen is metabolic activation to DNA adducts, leading to miscoding and mutations in critical growth control genes. Some tobacco smoke constituents such as nicotine and tobacco-specific nitrosamines binds directly to cellular receptors without a metabolic activation process. This can lead to activation of Akt, PKA and other pathways which contributes to the carcinogenic process. Furthermore, cigarette smoke contains compounds that can induce inflammation and resulting in enhanced pneumocyte proliferation, as well as co-carcinogens, tumor promoters, inducers of oxidative damage and gene promoter methylation, all processes which undoubtedly contribute to lung pathologies (Adams TN et al).[75, 81]

In another previous study conducted by Vanjare et al, current and history of smoking was presented in 22% of patients with CAP. This correlates very well with the Bochud study, which mentioned the incidence of smoking as 35.3% among its cohorts.[31, 53]

Positive history of exposure of biomass fuel was seen in 17.33 percent of the patients. Our results were in concordance with the results obtained by Yadav P et al who also reported similar findings. In their study, positive history of exposure of biomass fuel was seen in 22.4 percent of the patients. As per previous data, around 2.4 billion people use traditional biomass fuels for household cooking or heating. In 2006, the International Agency for Research on Cancer (IARC) concluded emissions from household coal combustion are a Group 1 carcinogen, while those from biomass were categorized as 2A due to epidemiologic limitations (Bruce N et al).[75, 82]

In the present study, Cough and fever were seen in 98.33 percent and 99 percent of the patients respectively. Sputum and shortness of breath was seen in 96 percent and 79.33 percent of the patients respectively. Chest pain and hemoptysis were seen in 39.67 percent and 13.67 percent of the patients respectively. Our results were in concordance with the results obtained by Yadav P et al who also reported similar findings. In their study, cough, fever, sputum and shortness of breath were seen in 99.2 percent, 89.6 percent, 98.4 percent and 77.6 percent of the patients respectively. Chest pain and hemoptysis were seen in 30.4 percent and 8 percent of the patients of their study.[75] In another study conducted by Patil SM et al, authors reported presence of fever, cough, expectoration, dyspnea and chest pain in 100 percent, 100 percent, 92 percent, 78 percent and 62 percent of the patients respectively.[76] In a study done by Joshua P et al, it was found showed that fever (88%) and cough (92%) has predominant symptoms with expectoration being 65% and dyspnea with 71%.[8]

Jadhav S et al, in another study, reported that almost all the patients have fever, cough with expectoration (100%), chest pain (64%) and dyspnea (62%).[80] In another study conducted by Shah et al, fever, cough, expectoration and chest pain were seen in 95 percent, 99 percent, 65 percent and 75 percent of the patients respectively.[46] Bansal et al, in another study reported presence of fever, cough, expectoration, dyspnea and chest pain were seen in 90 percent, 97 percent, 87 percent, 48 percent and 34 percent of the patients respectively.[79] Lamb A et al, in another study reported presence of cough, expectoration, hemoptysis, fever, chest pain and dyspnea in 92 percent, 80 percent, 18 percent, 100 percent, 66 percent and 48 percent of the patients respectively.[83]

In 41 percent and 38.33 percent of the patients in the present study, the duration of illness was between 2 to 4 weeks and less than 2 weeks respectively. In 20.67 percent of the patients, the duration of illness was more than 4 weeks. Our results were in concordance with the results obtained by Yadav P et al who also reported similar

findings. In their study, duration of illness was less than 2 weeks in 39.2 percent of the patients while it was between 2 to 4 weeks in 38.4 percent of the patients. In another study conducted by Vanjare et al, the mean duration of illness is 6.4 days.[53, 75]

On chest X ray evaluation, interstitial findings were seen in 74.4 percent of the patients. Lobar involvement was seen in 13.33 percent of the patients while lobular involvement was seen in 12.33 percent of the patients. In patients with COVID-19 etiology and non-COVID-19 etiologies, interstitial involvement was seen in 89.74 percent and 19.7 percent of the patients respectively. Significant results were obtained while comparing the chest X ray findings among COVID-19 and Non-COVID-19 patients. In a study conducted by Yasin R et al, majority of Chest X-ray findings of COVID-19 pneumonia patients was found to be consolidation opacities (81.3 percent of the patients).[84] In another study conducted by Taye PN et al, consolidation and ground glass opacities were 23.64 percent and 42.73 percent of the patients with COVID-19 associated CAP.[85] Abougazia, A et al, in another previous study reported that ground glass opacity, consolidation and reticular interstitial thickening was seen in 92.6 percent, 22.8 percent and 21.8 percent of the patients respectively.[86]

In the present study, 13.67 percent of the patients were diabetic while 12.67 percent of the patients were hypertensive. Chronic kidney disease was present in 6.67 percent of the patients while coronary artery disease was present in 6 percent of the patients. Obstructive airway disease (Asthma/COPD) was present in 13 percent of the patients while past history of TB was seen in 10.33 percent of the patients. Our results were in concordance with the results obtained by Yadav P et al who also reported similar findings. In their study, 8.8 percent and 7.2 percent of the patients were diabetic and hypertensive respectively. They reported presence of CKD, obstructive airway disease and positive post history of TB in 4.8 percent, 25.6 percent and 22.4 percent of the patients respectively.[75] In a similar study conducted by Vanjare et al, the most common underlying comorbidity for all patients was diabetes mellitus (71%), followed by hypertension in

50%, and chronic obstructive airway disease in 26% of the patients.[53] In another study conducted by Patil SM et al, hypertension, diabetes and COPD were present in 10 percent, 18 percent and 22 percent of the patients respectively. Structural lung diseases and associated diseases (e.g. Diabetes) alters the local lung defense mechanisms and systemic defense mechanisms, predisposes it to acute lung infection.[76] In a study done by Rello J et al and Restrepo M.I et al showed increased incidence of CAP in COPD patients.[87, 88]

Almirallet al reported that even in persons without COPD, the proportion of CAP cases attributable in the population to ever having consumed any type of tobacco was 23%. Alterations in the immune system and inflammatory mechanisms in smokers are well known. Tobacco smoking is the most important risk factor for the development of COPD and these patients were known to have higher risk of pneumonia and other respiratory infections. Both smoking and COPD are predisposing risk factors for CAP. These patients have altered mucocilliary mechanisms in the lower respiratory tract and stasis of secretions in lung parenchyma, which predispose to pneumonia. COPD patients who are on regular inhaled corticosteroids are also susceptible to respiratory infections.[38]

While evaluating the patients on the basis of PSI class, it was seen that out of 300 patients with CAP, 30.67 percent and 23.67 percent of the patients were of class I and class II respectively. 19.67 percent, 17 percent and 9 percent of the patients were of class III, class IV and class V respectively. In a similar study conducted by Patil P et al, 12 percent and 21 percent of the patients were of class I and class II respectively. 19 percent, 34 percent and 14 percent of the patients were of class III, class IV and class V respectively.[76]

Among 78 percent of the patients, the etiology was COVID 19. In 10.33 percent of the patients, CAP was of bacteriological etiology (Klebsiella) while 2.67 percent of the patients with CAP had viral etiology (Influenza A H1N1). Tuberculous etiology was seen in 5 percent of the patients while etiology was unknown in 4 percent of the patients. Similar findings have been reported in the past literature. In a study conducted

by Lamb et al, Klebsiella and Influenza were etiologic agents of CAP in 14 percent and 2 percent of the patients respectively.[83]

Mean hemoglobin levels and total WBC count was 11.5 gm/dL and 10.2 x 10^9 cells/ L respectively. Total platelet count, serum creatinine levels, random blood sugar and C Reactive proteins levels were found to be 2.6 lakh/ mm^3, 1.8 mg/dL, 187.7 mg/dL and 52.9 mg/L respectively.

Overall, mechanical ventilation was required in 47.33 percent of the patients. Among patients with COVID-19 etiology, significantly higher proportion of patients required mechanical ventilation (55.12 percent) in comparison to patients with non-COVID-19 etiology (19.69 percent); the results of which were found to be statistically significant. Para RA et al, in another study reported mechanical ventilation in 11.5 percent of the patients.[67]

Overall, mean hospital stay duration was 11.4 days. Among patients with COVID-19 etiology, significantly higher hospital stay duration was present (11.9 days) in comparison with non-COVID-19 etiology (9.7 days); the results of which were found to be statistically significant. In a study conducted by Roshni KS et al, most of the patients (83.33 %) required hospitalization for less than 10 days, 11.66 % required stay between 11-15 days and only 5% for more than 15 days with the mean duration of 7.74 days.[77] This is in par with the study conducted by Bansal S et al (9.11 days) and Shrestha et al (8 days).[78, 79] Kollanur J et al, in another study reported the duration of hospital stay to be 5.83 days.[89]

Overall, mortality was seen in 51 percent of the patients. Poovieng, J et al in a previous study reported that the overall in-hospital mortality rate of inpatients with pneumonia was 31.2%.[49] This was higher when compared with that in nationwide hospital admission data in 2010 reporting that the mortality rate among adults aged ≥ 60 years with pneumonia was approximately 9.2–15.5% (Reechaipichitkul W et al).[90] Poovieng, J et al found that the in-hospital and 28-day mortality rate in CAP and HCAP were comparable while approximately twice higher in HAP.[49] Osman, M. et al in a study conducted at Bamrasnaradura

Infectious Diseases Institute in Thailand reported mortality associated with CAP to be 17.9%.[50] Mortality rates for patients hospitalized with CAP reported by related studies have ranged from 12 to 30% (Fine MJ et al[54], Brito V et al[91]). In Korean tertiary teaching hospitals, overall mortality associated with CAP was 6.3% (Ahn JH et al).[51]

In a study conducted by Abdullahi BB et al in Indian subcontinent, overall mortality rate among CAP patients was reported to be 16 percent. Other studies have reported that the mortality rate of CAP patients in outpatient settings is 1%–5%, and in Intensive Care Unit, it is 25% (Shah et al).[46, 52] Vanjare PH et al, in another previous study reported that the overall inpatient mortality was 38%.[53]

Mortality rate among patients with COVID-19 etiology was significant higher (60.25 percent) in comparison to patients with other etiologies (Influenza A H1N1 etiology: 12.5 percent, Klebsiella etiology: 19.35 percent, Tuberculous etiology: 20 percent, and Unknown etiology: 16.67 percent) (p- value < 0.05). In another study conducted by Patil SM et al, mortality rate among CAP patients with bacteriological etiology was 8 percent.[76]

Mortality was significantly higher among patients of PSI Class V (74.07 percent) in comparison to patients of Class IV (60.78 percent), Class III (42.39 percent), Class II (49.39 percent) and Class I (39.13 percent). While assessing the correlation of PSI Class with outcome, significant results were obtained. In a study conducted by Patil P et al, overall mortality was significantly higher among patients of PSI Class V (64.29 percent) in comparison to patients of Class IV (17.65 percent), Class III (10.53 percent), and Class II (4.76 percent).[76]

In the present study, 29.1 percent of the COVID- 19 patients and 30.3 percent of the non-COVID-19 patients were smokers. Non-significant results were obtained while comparing the distribution of smokers among COVID and Non-COVID patients. Positive history of biofuel exposure was seen in 17.9 percent of the COVID- 19 patients and 15.2 percent of the non-COVID-19 patients were smokers. Positive past history of TB was present in 9.41 percent and 12.12 percent of the patients with COVID-19 and non-COVID-19 etiology respectively (p-

value >0.05). History of Upper respiratory tract infection was present in 65.38 percent of the COVID-19 patients and 57.57 percent of the non-COVID-19 patients (p- value >0.05).

In the present study, 11.53 percent of COVID-19 etiology patients and 16.67 percent of the non-COVID-19 patients were hypertensive (p-value > 0.05). In a study conducted by Todi S et al, 45.8 percent of the COVID-19 patients and 57.9 percent of non-COVID-19 patients were hypertensive; on comparing they also observed non-significant results.[92] Hedberg P et al, in another study, reported that 46 percent of COVID-19 patients and 39 percent of the Non-COVID patients respectively were hypertensive.[93] Di Mitri C et al in another study, reported that 42 percent of non-COVID-19 patients and 53 percent of the COVID patients were hypertensive.[94]

In the present study, 11.96 percent of COVID-19 etiology patients and 15.15 percent of the non-COVID-19 patients were diabetic (p-value > 0.05). In a study conducted by Todi S et al, 37.5 percent of the COVID-19 patients and 50.52 percent of non-COVID-19 patients were diabetic; on comparing they also observed non-significant results.[92] Hedberg P et al, in another study, reported that 28 percent of COVID-19 patients and 17 percent of the Non-COVID patients respectively were diabetic.[93] In another study conducted by Bain et al, 48.1 percent of the COVID-19 patients and 35.38 percent of the patients were diabetic. Di Mitri C et al in another study, reported that 26 percent of non-COVID-19 patients and 15 percent of the COVID patients were diabetic.[94, 95]

In the present study, 6.42 percent of COVID-19 etiology patients and 7.58 percent of the non-COVID-19 patients had positive history of CKD (p-value > 0.05). Hedberg P et al, in a previous study, reported that 3 percent of COVID-19 patients and 14 percent of the Non-COVID patients respectively had positive history of CKD. Di Mitri C et al in another study, reported that 20 percent of non-COVID-19 patients and 5.6 percent of the COVID patients had positive history of CKD. In another study conducted by Bain et al, 14.8 percent of the COVID-19 patients and 23.07 percent of the patients had positive history of CKD.[93- 95]

In the present study, 5.12 percent of COVID-19 etiology patients and 9.09 percent of the non-COVID-19 patients had positive history of CAD (p-value > 0.05). 11.96 percent of COVID-19 etiology patients and 16.67 percent of the non-COVID-19 patients had positive history of obstructive airway disease (p-value > 0.05). Hedberg P et al, in a previous study, reported that 16 percent of COVID-19 patients and 10 percent of the Non-COVID patients respectively had positive history of Chronic respiratory diseases.[93] In another study conducted by Bain et al, 25.9 percent of the COVID-19 patients and 23.07 percent of the patients had positive history of COPD.[95] Di Mitri C et al in another study, reported that 28 percent of non-COVID-19 patients and 13 percent of the COVID patients had positive history of COPD.[94]

In the present study, mean hospital stay among patients with COVID-19 etiology and non-COVID-19 etiology was 11.86 days and 9.74 days respectively (p-value < 0.05). In a study conducted by Todi S et al, mean duration of hospital stay was 13.75 days among COVID-19 patients which was significantly higher in comparison to non-COVID-19 patients (7.67 days).[92] Hedberg P et al, in a previous study reported that mean duration of hospital stay was 15 days among COVID-19 patients and was 8 days among non-COVID-19 patients.[93] Di Mitri C et al, in another study reported that length of hospital stay was 9 days among non-COVID patients and was 30 days in COVID patients.[94]

In the present study, Mechanical ventilation was required in 55.1 percent of the patients with COVID-19 etiology and in 19.7 percent of the patients with non-COVID-19 etiology. Hence; larger proportion of patients with COVID-19 etiology required mechanical ventilation.

In the present study, significantly higher proportion of patients of COVID-19 etiology were of PSI grading four and five while among patients with Non-COVID-19 etiology, majority of patients were of PSI grading two and three (p-value < 0.05).

In the present study, mortality rate was 60.25 percent among patients with COVID-19 etiology while it was 18.2 percent among patients with non-COVID etiology. On comparing the results were found to be

significant statistically. In a study conducted by Todi S et al, although non-significant, overall morality was higher among COVID-19 patients (43.8 percent) in comparison to non-COVID-19 patients (40 percent).[92] Hedberg P et al, in another previous study, reported that mortality rate among COVID-19 and non-COVID-19 patients was 26 percent and 11 percent respectively (p-value < 0.05).[93] Bains WM et al, in another previous study, reported that mortality rate among COVID-19 and non-COVID-19 patients was 44.44 percent and 35.83 percent respectively (p-value < 0.05).[95]

Out of 300 patients with CAP, ICU admissions were seen in 67 percent of the patients. Among COVID-19 CAP patients, ICU admission was required in 73.08 percent of the patients while among Non-COVID-19 CAP patients, ICU admission was needed in 45.45 percent of the patients (p-value < 0.05). In a study conducted by Sadeghi et al, 55(25.7%) patients were admitted in ICU. The ICU admitted patient's mortality rate was about 68%.Persona P et al, in their study reported that out of 28 patients with COVID associated CAP admitted to ICU, 18 survived, were stabilized and then referred to other units.[96, 97]

Pulmonary complications were seen in 91.33 percent of the patients. Among them, respiratory failure and pulmonary embolism were seen in 78 percent and 13.33 percent of the patients respectively. Pulmonary complications were seen in 94.02 percent of the patients with COVID-19 etiology and in 81.81 percent of the patents with non-COVID-19 etiology. CVS complications were seen in 70.67 percent of the patients. Among them, shock, MI and arrythmias were seen in 40 percent, 12 percent and 18.67 percent of the patients respectively.CVS complications were seen in 73.08 percent of the patients with COVID-19 etiology and in 62.12 percent of the patents with non-COVID-19 etiology. GIT complications were seen in 36 percent of the patients among which bleeding, LFT's dysfunction, vomiting and diarrhea was seen in 2.67 percent, 10 percent, 16.67 percent and 6.67 percent of the patients respectively. GIT complications were seen in 34.18 percent of the patients with COVID-19 etiology and in 42.42 percent of the patents with non-COVID-19 etiology. Among hematological complications,

coagulopathy was seen in 17.67 percent of the patients. Hematological complications were seen in 18.38 percent of the patients with COVID-19 etiology and in 15.15 percent of the patents with non-COVID-19 etiology. In a study conducted by El Moheb M et al, Gastrointestinal complications also appear to be more common in patients with ARDS from COVID-19 compared with patients who have ARDS for other reasons (74 versus 37 percent).[98]

A hypercoagulable state resulting in arterial and venous thromboses is common in critically ill patients with COVID-19. The largest study, which included 3334 individuals reported stroke in 1.6 percent and myocardial infarction in 8.9 percent of COVID associated CAP patients (Bilaloglu S et al).[31]

In the present study, while comparing the correlation of morality with complications among COVID-19 CAP and non-COVID-19 CAP patients, non-significant results were obtained. However; while comparing in outcome of respiratory failure among COVID-19 CAP and non-COVID-19 CAP patients, mortality among patients with respiratory failure among COVID-19 CAP group was significantly higher (52.31 percent) in comparison to non-COVID-19 CAP group (22.22 percent) (p-value < 0.05).

Similar results were reported in past literature. In a study conducted by El-Sayed MS et al, pulmonary embolism was confirmed in 23.6 percent of the COVID-19 CAP and 6.9 percent of the non-COVID-19 CAP.[99] In another study conducted by Riyahi S et al, authors reported that 24.69 of the patients with COVID-19 CAP developed pulmonary embolism.[100]

Among various early studies was one by Spodick et al, who studied 150 patients hospitalised with acute myocardial infarction (AMI) and 150 appropriately matched controls, and noted that there was an increased risk of minor acute respiratory symptoms in patients with AMI. The authors suggested that there was a need to investigate whether there was a relationship between these infections, assumed to be of viral origin, and AMI.[101]

Musher et al documented cardiac events in almost 20% of cases with pneumococcal CAP. These complications are more common in older individuals, those with more severe pneumonia and in those with pre-existing cardiovascular events; however, it is important to note that they can occur in cases with no underlying risk factors.[102]

A retrospective study by Mauro et al assessed patients with signs of upper gastrointestinal hemorrhage which were tested positive for COVID-19. The mean age of the patients was 75 years and, after performing upper gastrointestinal endoscopy in some, it was found peptic ulcer was the most common finding (44%), followed by hemorrhagic gastritis (22%). Of the 23 patients, 18 were discharged and five died due to worsening of the infection, corresponding to a mortality rate of 21.7%.[103] A case series investigating SARS-CoV-2 infection by Barrett et al. 4 reported that six patients who experienced gastrointestinal hemorrhage demonstrated an increased risk for bleeding among those with COVID-19.[104]

A multi-group clinical study found that the degree of liver injury in COVID-19 patients was related to different clinical types, where mild and moderate patients had abnormally elevated ALT and AST, but the rate of elevation was much lower than that in severe and critically ill patients. Huang et al showed that of 13 patients in the intensive care unit, 8 (62%) had increased AST, while of 28 patients who were not admitted to the intensive care unit, 7 (25%) had increased AST. The reason for this may be that severe and critically ill patients require long-term and more metered antiviral drugs, such as arbidol, lopinavir/ritonavir, etc.[105, 106]

After analyzing the predictors of morality, it was seen that cough, chest pain, duration of illness, COVID-19 etiology, need for mechanical ventilation, higher PSI grading and presence of cardiovascular complications were associated with significantly higher mortality. Our results were in concordance with the results obtained by previous authors who also reported similar findings. In previous studies conducted by Glöckner V et al and Sirventa JM et al, need for mechanical Ventilation was observed to be significant risk factor of

mortality among CAP patients. In another study conducted by Aziz AOA et al, 92.9 percent of the non-survivors required mechanical ventilation while only 65.5 percent of the non-survivors required mechanical ventilation.[107-109]

We observed significantly higher mortality among patients with higher severity grading according to PSI. Similar to our results, Zhang GX et al, Guertler C et al and Glöckner V et al, in their studies on CAP, also reported significantly higher mortality associated with higher severity grading of PSI.[107, 110, 111]

Occurrence of cardiovascular complications in the present study was associated with significant higher risk of mortality among CAP patients in comparison to CAP patients without cardiovascular complications. Feldman C reported that cardiac complications in patients with CAP appear not only to be associated with in-hospital mortality, but they also appear to contribute to longer-term mortality of patients with CAP, even after their discharge from hospital. In another previous study conducted by Desai et al, authors reported that at long-term follow-up, cardiac events account for more than 30% of deaths in CAP patients, making them a significant cause of mortality. If patients at risk for cardiac events are stratified, diagnostic tools, monitoring, and preventive measures may be applied to these patients. A prospective evaluation of cardioprotective treatments is urgently required from a research point of view.[112, 113]

Shreds of literature evidence reported increased short-term mortality in patients with concurrent CAP and cardiac events, ranging from 15% to 36% and with an odds ratio (OR) from 1.6 to 3.9 (Viasus D et al, Griffin AT et al).[114, 115]

Cardiovascular events are also related to 90-day mortality with an OR of 1.93 for AMI and 2.39 for atrial fibrillation (Mandal P et al). All these data confirmed previous findings by Mortensen et al. who reported that, after neurological conditions and malignancy, cardiac ischemia was the third most common underlying cause of death 90 days after an episode of pneumonia. During hospitalization, cardiovascular complications are responsible for the major causes of long-term morbidity and mortality.

Recently, Bruns et al. reported an increased risk of death at 1, 5, and 7 years following an episode of CAP compared with the general Dutch population. Overall, 16% of deaths in this cohort were caused by cardiovascular events. In a similar study conducted by Ibrahim AL who also didn't observe any significant difference while evaluating role of gender as a risk factor of mortality.[116-119]

Clinical results can be improved by early detection and intervention in these patients who are at a high risk of death. To gain a better understanding of mortality in CAP patients who develop complications, multicenter studies are needed.

SUMMARY AND CONCLUSION

The present study was conducted to determine the etiology and clinical profile of patients presenting with community acquired pneumonia at our institute. A total of 300 patients were enrolled. Following results were obtained:

- 35.33 percent of the patients belonged to the age group of more than 60 years while 21.33 percent of the patients belonged to the age group of 51 to 60 years. 18.33 percent and 13.33 percent of the patients belonged to the age group of 41 to 50 years and 31 to 40 years respectively.11.67 percent belonged to age group of 18 to 30 years. Mean age of the patients was 52.85 years.
- 67.33 percent of the patients were males while the remaining were females.
- 36 percent of the patients were smokers while the remaining were non-smokers.
- Positive history of exposure of biomass fuel was seen in 17.33 percent of the patients.
- Cough and fever were seen in 98.33 percent and 99 percent of the patients respectively. Sputum and shortness of breath was seen in 96 percent and 79.33 percent of the patients respectively. Chest pain and haemoptysis were seen in 39.67 percent and 13.67 percent of the patients respectively.
- In 41 percent and 38.33 percent of the patients, the duration of illness was between 2 to 4 weeks and less than 2 weeks respectively. In 20.67 percent of the patients, the duration of illness was more than 4 weeks.
- 13.67 percent of the patients were diabetic while 12.67 percent of the patients were hypertensive. Chronic kidney disease was present in 6.67 percent of the patients while coronary artery disease was present in 6 percent of the patients. Obstructive airway disease (Asthma/COPD) was present in 13 percent of the patients while past history of TB was seen in 10.33 percent of the patients.

- On chest X ray evaluation, interstitial findings were seen in 74.4 percent of the patients. Lobar involvement was seen in 13.33 percent of the patients while lobular involvement was seen in 12.33 percent of the patients. In patients with COVID-19 etiology and non-COVID-19 etiologies, interstitial involvement was seen in 89.74 percent and 19.7 percent of the patients respectively. Significant results were obtained while comparing the chest X ray findings among COVID-19 and Non-COVID-19 patients.
- URTI and diabetes were risk factors for CAP in 63.67 and 13.67 percent of the patients while positive smoking history and history of biomass fuel exposure were seen in 36 percent and 17.33 percent of the patients respectively. History of lung pathology was seen in 13 percent of the patients.
- Out of 300 patients with CAP, 30.67 percent and 23.67 percent of the patients were of class I and class II respectively. 19.67 percent, 17 percent and 9 percent of the patients were of class III, class IV and class V respectively.
- Among 78 percent of the patients, the etiology was COVID 19. In 10.33 percent of the patients, CAP was of bacteriological etiology (Klebsiella) while 2.67 percent of the patients with CAP had viral etiology (Influenza A H1N1). Tuberculous etiology was seen in 5 percent of the patients while etiology was unknow in 4 percent of the patients.
- Mean haemoglobin levels and total WBC count was 11.5 gm/dL and 10.2 x 109 cells/ L respectively. Total platelet count, serum creatinine levels, random blood sugar and C Reactive proteins levels were found to be 2.6 lakh/ mm3, 1.8 mg/dL, 187.7 mg/dL and 52.9 mg/L respectively.
- Overall, mechanical ventilation was required in 47.33 percent of the patients. Among patients with COVID-19 etiology, significantly higher proportion of patients required mechanical ventilation (55.12 percent) in comparison to patients with non-COVID-19 etiology

(19.69 percent); the results of which were found to be statistically significant.

- Overall, mean hospital stay duration was 11.4 days. Among patients with COVID-19 etiology, significantly higher hospital stay duration was present (11.9 days) in comparison with non-COVID-19 etiology (9.7 days); the results of which were found to be statistically significant.
- Out of 300 patients with CAP, ICU admissions were seen in 67 percent of the patients.
- Overall, mortality was seen in 51 percent of the patients. Pulmonary complications were seen in 91.33 percent of the patients. Among them, respiratory failure and pulmonary embolism were seen in 78 percent and 13.33 percent of the patients respectively. CVS complications were seen in 70.67 percent of the patients. Among them, shock, MI and arrythmias were seen in 40 percent, 12 percent and 18.67 percent of the patients respectively. GIT complications were seen in 36 percent of the patients among which bleeding, LFT's dysfunction, vomiting and diarrhoea was seen in 2.67 percent, 10 percent, 16.67 percent and 6.67 percent of the patients respectively. Among haematological complications, coagulopathy was seen in 17.67 percent of the patients.
- Mortality rate among patients with COVID-19 etiology was significant higher (60.25 percent) in comparison to patients with other etiologies (Influenza A H1N1 etiology: 12.5 percent, Klebsiella etiology: 19.35 percent, Tuberculous etiology: 20 percent, and Unknown etiology: 16.67 percent) (p- value < 0.05).
- Mortality was significantly higher among patients of PSI Class V (74.07 percent) in comparison to patients of Class IV (60.78 percent), Class III (42.39 percent), Class II (49.39 percent) and Class I (39.13 percent). While assessing the correlation of PSI Class with outcome, significant results were obtained.
- 11.53 percent of COVID-19 etiology patients and 16.67 percent of the non-COVID-19 patients were hypertensive (p-value > 0.05).

11.96 percent of COVID-19 etiology patients and 15.15 percent of the non-COVID-19 patients were diabetic (p-value > 0.05). 6.42 percent of COVID-19 etiology patients and 7.58 percent of the non-COVID-19 patients had positive history of CKD (p-value > 0.05). 5.12 percent of COVID-19 etiology patients and 9.09 percent of the non-COVID-19 patients had positive history of CAD (p-value > 0.05). 11.96 percent of COVID-19 etiology patients and 16.67 percent of the non-COVID-19 patients had positive history of obstructive airway disease (p-value > 0.05). 9.41 percent of COVID-19 etiology patients and 12.12 percent of the non-COVID-19 patients had positive past history of TB.

- 65.38 percent of the COVID-19 CAP patients and 57.57 percent of non-COVID-19 CAP patients had presence of URTI as risk factor of CAP. 11.96 percent of the COVID-19 CAP patients and 16.67 percent of non-COVID-19 CAP patients had presence of lung pathology as risk factor of CAP. 29.1 percent of the COVID-19 CAP patients and 30.3 percent of non-COVID-19 CAP patients had positive smoking habit. 17.9 percent of the COVID-19 CAP patients and 15.2 percent of non-COVID-19 CAP patients had positive history of biomass fuel exposure.
- Significantly higher proportion of patients of COVID-19 etiology were of PSI grading four and five while among patients with Non-COVID-19 etiology, majority of patients were of PSI grading two and three (p-value < 0.05).
- Significantly higher proportion of patients of COVID-19 etiology were of PSI grading four and five while among patients with Non-COVID-19 etiology, majority of patients were of PSI grading two and three (p-value < 0.05).
- Mortality rate was 60.3 percent among patients with COVID-19 etiology while it was 18.2 percent among patients with non-COVID etiology. On comparing the results were found to be significant statistically.

- Mean hospital stay among patients with COVID-19 etiology and non-COVID-19 etiology was 11.9 days and 9.7 days respectively (p-value < 0.05).
- Among COVID-19 CAP patients, ICU admission was required in 73.08 percent of the patients while among Non-COVID-19 CAP patients, ICU admission was needed in 45.45 percent of the patients (p-value < 0.05).
- Pulmonary complications were seen in 94.02 percent of the patients with COVID-19 etiology and in 81.81 percent of the patents with non-COVID-19 etiology. CVS complications were seen in 73.08 percent of the patients with COVID-19 etiology and in 62.12 percent of the patents with non-COVID-19 etiology. GIT complications were seen in 34.18 percent of the patients with COVID-19 etiology and in 42.42 percent of the patents with non-COVID-19 etiology. Haematological complications were seen in 18.38 percent of the patients with COVID-19 etiology and in 15.15 percent of the patents with non-COVID-19 etiology.

Under the light of above obtained results, following conclusion can be withdrawn:

- Long recognised as a major cause of death, CAP has been studied intensively since decades ago, the result of which led to many formative insights in modern microbiology, despite this research and the development of anti-microbial agents, pneumonia remains a major cause of complications and death.
- Early diagnosis, especially in high risk patients such as patients with COPD, Diabetes, Alcoholics, Smokers with early initiation of antibiotics based on the prevalence of organisms in that community can help reduce the morbidity and mortality in Community Acquired Pneumonia.
- Application of molecular diagnostic techniques has the potential to lead to more targeted therapy in the face of increasing antibiotic

resistance. However further studies are recommended for better exploration of results.

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S No	MRD No.	Age (years)	Gender	Smoking	Biofuel exposure	Cough	Sputum	Fever	Shortness of breath	chest pain	Hemoptysis	Others	Diabetes	HTN	CKD	CAD	Obstructive airway disease	Past H of TB	URTI	Lung path	Radiologic
1	895635	68	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Present	Present	Absent	Present	Absent	Absent	Present	Absent	Lobular
2	784512	64	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
3	785623	65	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Present	Present	Absent	Present	Absent	Absent	Present	Absent	Lobular
4	789456	62	Male	Absent	Absent	Present	Present	Present	Absent	absent	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
5	789123	63	Female	Absent	Present	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
6	741852	63	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Present	Present	Absent	Absent	Absent	Absent	Present	Absent	Lobular
7	852963	65	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Interstitial
8	951753	64	Female	Absent	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobar
9	1002365	67	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Present	Present	Present	Absent	Absent	Absent	Absent	Interstitial
10	998877	68	Male	Present	Absent	Present	Absent	Present	Present	absent	absent	absent	Present	Absent	Present	Absent	Absent	Absent	Absent	Absent	Lobular
11	998874	28	Female	Absent	Present	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobular
12	998866	29	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
13	889966	25	Male	Present	Absent	Absent	Absent	Absent	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
14	875623	27	Female	Absent	Present	Present	Present	Present	Present	Present	absent	Present	Absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Interstitial
15	365896	28	Male	Absent	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Lobular
16	1000123	29	Male	Absent	Absent	Present	Absent	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
17	965830	28	Female	Absent	Present	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Lobar
18	1000081	27	Male	Present	Absent	Absent	Absent	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
19	775566	28	Male	Absent	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobular
20	774455	29	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
21	773352	28	Male	Present	Absent	Absent	Absent	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobular
22	779912	25	Male	Absent	Absent	Absent	Absent	Absent	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
23	875521	25	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
24	875469	26	Female	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Interstitial
25	877795	25	Male	Present	Absent	Absent	Absent	Absent	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobar
26	963222	25	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Lobular
27	952360	24	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
28	952683	26	Male	Present	Absent	Present	Present	Present	Present	Present	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
29	969600	22	Male	Absent	Absent	Present	Present	Present	Absent	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
30	969601	23	Female	Absent	Present	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
31	966950	26	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
32	971346	29	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobular
33	971382	28	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Present	Present	Present	Absent	Lobular
34	937146	27	Female	Absent	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Lobar
35	917346	29	Male	Absent	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Lobular
36	791348	28	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Interstitial
37	794156	27	Female	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Lobar
38	784512	28	Male	Absent	Absent	Present	Absent	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Present	Interstitial
39	785621	25	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
40	784916	20	Female	Absent	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
41	784213	23	Male	Present	Absent	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
42	949466	28	Male	Absent	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Present	Interstitial
43	949562	29	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Interstitial
44	948752	28	Male	Present	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
45	944563	27	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobar
46	978789	34	Female	Absent	Present	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
47	975648	37	Male	Absent	Absent	Present	Present	Present	Absent	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobular
48	668844	35	Male	Present	Absent	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobar
49	895620	38	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Interstitial
50	1000754	34	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Present	Lobular
51	1000007	35	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
52	852258	34	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobular
53	741147	38	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	Present	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent	Interstitial
54	963369	37	Female	Absent	Present	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
55	752257	34	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobular
56	763367	31	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobar
57	852418	35	Male	Present	Absent	Present	Present	Present	Present	absent	absent	Present	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobular
58	863258	34	Male	Absent	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Present	Interstitial
59	965230	32	Female	Absent	Present	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent	Lobular
60	965552	64	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	Present	Present	Present	Absent	Present	Absent	Absent	Absent	Absent	Interstitial
61	767675	68	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobular
62	757645	67	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial

S No	MRD No.	Duration of illness	Etiology	Hb	TLC (10*9)	Platelet count	S creat	RBS	CRP	Mechanical ventilation	Hospital stay (days)	PSI Grading	ICU admission	Pulmonary Complications	CVS Complications	GIT Complications	Haematological complications	Outcome
1	895635	Less than 2 wks	Covid	12	9	2.3	20	197	70.1	Yes	16	3	Present	Resp Fail	SHOCK	Absent	Absent	Survived
2	784512	2 to 4 wks	Klebsiella	12	12	1.8	20	197	46.1	No	9	4	Absent	Resp Fail	Absent	Absent	Absent	Survived
3	785623	Less than 2 wks	Covid	9	12	2.1	23	176	49.2	Yes	15	3	Present	Resp Fail	SHOCK	Absent	Absent	Death
4	789456	2 to 4 wks	Covid	10	10	1.9	21	215	42.5	Yes	17	5	Present	Absent	MI	Vomit	Absent	Death
5	789123	2 to 4 wks	Unknown	12	10	2.1	16	188	48.9	Yes	15	4	Absent	Embol	SHOCK	Absent	Absent	Death
6	741852	Less than 2 wks	Covid	9	10	1.8	23	177	48.2	No	12	3	Present	Resp Fail	SHOCK	Absent	Absent	Survived
7	852963	2 to 4 wks	Covid	13	10	2.3	18	178	46.9	Yes	15	4	Present	Resp Fail	Arry	LFT	Absent	Death
8	951753	2 to 4 wks	Klebsiella	12	13	2.6	23	195	48.4	No	5	3	Present	Absent	SHOCK	Absent	Absent	Death
9	1002365	Less than 2 wks	Covid	13	11	1.9	19	183	59.6	Yes	15	5	Present	Resp Fail	SHOCK	Absent	Present	Death
10	998877	Less than 2 wks	Covid	12	11	1.8	13	201	53.2	Yes	15	5	Present	Absent	Arry	Absent	Absent	Death
11	998874	Less than 2 wks	Covid	13	8	1.8	18	153	51.7	Yes	15	3	Present	Resp Fail	SHOCK	Absent	Present	Death
12	998866	2 to 4 wks	Influenza	12	9	1.2	19	158	48.4	Yes	17	4	Absent	Absent	SHOCK	Absent	Present	Death
13	889966	Less than 2 wks	Covid	10	10	1.6	21	166	49.5	No	8	2	Absent	Resp Fail	SHOCK	Absent	Absent	Survived
14	875623	Less than 2 wks	Covid	13	12	3.2	23	214	49.2	No	8	3	Absent	Resp Fail	SHOCK	Vomit	Absent	Survived
15	365896	2 to 4 wks	Covid	11	12	3.4	16	175	62.5	No	8	3	Present	Resp Fail	Arry	Absent	Absent	Survived
16	1000123	Less than 2 wks	Covid	10	8	2.1	15	145	57.8	Yes	7	2	Present	Resp Fail	SHOCK	LFT	Absent	Survived
17	965830	2 to 4 wks	Klebsiella	9	8	2.1	15	189	48.6	Yes	9	2	Absent	Resp Fail	SHOCK	LFT	Absent	Survived
18	1000081	2 to 4 wks	Klebsiella	13	9	2.6	18	181	63.4	Yes	15	2	Present	Resp Fail	Absent	Absent	Absent	Survived
19	775566	Less than 2 wks	Covid	12	9	1.8	15	189	58.7	No	8	1	Present	Resp Fail	SHOCK	Absent	Absent	Survived
20	774455	2 to 4 wks	Covid	12	12	2.2	15	176	54.2	No	9	2	Present	Resp Fail	Arry	Absent	Absent	Survived
21	773352	Less than 2 wks	Covid	13	8	1.9	17	165	58.3	Yes	15	4	Absent	Absent	Absent	Absent	Absent	Death
22	779912	Less than 2 wks	Covid	9	10	2.5	16	229	49.2	No	10	3	Absent	Resp Fail	SHOCK	Absent	Absent	Death
23	875521	2 to 4 wks	Influenza	9	12	1.9	23	167	50.4	No	9	2	Absent	Embol	Absent	Vomit	Absent	Survived
24	875469	Less than 2 wks	Covid	12	8	2.7	20	196	70.7	No	6	3	Present	Resp Fail	Arry	LFT	Absent	Survived
25	877795	Less than 2 wks	Klebsiella	10	10	2.2	20	185	57.6	Yes	15	5	Absent	Embol	Absent	Absent	Absent	Death
26	963222	2 to 4 wks	Covid	12	8	2.4	14	182	57.8	No	8	1	Present	Resp Fail	Arry	Absent	Absent	Survived
27	952360	Less than 2 wks	Covid	14	9	2	12	175	55.5	Yes	16	3	Present	Absent	Absent	Absent	Absent	Death
28	952683	Less than 2 wks	Covid	15	10	3.2	16	182	69.8	No	6	3	Present	Resp Fail	Arry	Absent	Absent	Survived
29	969600	2 to 4 wks	Covid	12	9	3.1	17	192	63.2	Yes	8	2	Present	Resp Fail	SHOCK	Diaar	Absent	Survived
30	969601	Less than 2 wks	Covid	13	9	1.8	12	183	49.8	No	9	3	Absent	Absent	Arry	Absent	Absent	Survived
31	966950	Less than 2 wks	Klebsiella	14	9	2.4	18	168	60.1	Yes	15	4	Present	Absent	SHOCK	Absent	Absent	Death
32	971346	2 to 4 wks	Tuberculous	13	12	2.5	21	168	59.8	Yes	17	5	Present	Absent	Arry	Vomit	Present	Death
33	971382	Less than 2 wks	Tuberculous	12	11	2.2	15	186	46.5	Yes	15	4	Absent	Resp Fail	Arry	Absent	Absent	Death
34	937146	2 to 4 wks	Klebsiella	12	10	3.2	17	184	57.6	No	8	3	Absent	Embol	Absent	Absent	Absent	Survived
35	917346	Less than 2 wks	Covid	12	9	1.9	17	175	53.1	Yes	17	5	Present	Resp Fail	SHOCK	Absent	Absent	Death
36	791348	2 to 4 wks	Covid	9	10	1.2	20	208	56.3	Yes	17	4	Present	Resp Fail	Arry	Vomit	Absent	Death
37	794156	2 to 4 wks	Klebsiella	10	12	2.1	21	178	56.8	No	8	3	Absent	Embol	Absent	Absent	Absent	Survived
38	784512	Less than 2 wks	Covid	13	13	1.8	20	196	45.6	No	8	1	Absent	Resp Fail	Arry	Absent	Absent	Survived
39	785621	2 to 4 wks	Covid	12	9	2.3	21	194	63.7	Yes	17	3	Present	Resp Fail	SHOCK	Absent	Absent	Death
40	784916	Less than 2 wks	Unknown	12	13	2	20	202	52.1	No	8	2	Absent	Resp Fail	Absent	Absent	Absent	Survived
41	784213	Less than 2 wks	Covid	12	10	2.3	16	194	46	No	7	5	Absent	Resp Fail	Arry	Absent	Absent	Death
42	949466	2 to 4 wks	Covid	12	9	2.2	12	175	63.4	No	5	1	Present	Resp Fail	SHOCK	Absent	Absent	Survived
43	949562	2 to 4 wks	Covid	15	12	2.1	21	207	46.5	Yes	15	3	Absent	Resp Fail	MI	Vomit	Present	Survived
44	948752	Less than 2 wks	Klebsiella	13	10	2.4	21	183	49.1	No	6	5	Absent	Embol	SHOCK	Absent	Absent	Death
45	944563	2 to 4 wks	Klebsiella	10	9	2.3	18	188	45.3	Yes	15	2	Absent	Resp Fail	Absent	Diaar	Absent	Survived
46	978789	2 to 4 wks	Covid	13	10	1.8	16	142	60.7	No	7	2	Absent	Resp Fail	SHOCK	Absent	Absent	Survived
47	975648	Less than 2 wks	Covid	14	10	2.2	21	231	53.2	Yes	15	4	Present	Resp Fail	Arry	LFT	Absent	Death
48	668844	2 to 4 wks	Tuberculous	12	10	2.6	22	179	51.2	Yes	15	4	Present	Resp Fail	Arry	Vomit	Absent	Death
49	895620	2 to 4 wks	Covid	12	9	2.1	20	174	54.5	Yes	15	3	Absent	Resp Fail	SHOCK	Absent	Absent	Death
50	1000754	Less than 2 wks	Covid	10	11	2.1	18	174	52.8	Yes	17	5	Present	Resp Fail	Arry	Absent	Absent	Death
51	1000007	2 to 4 wks	Covid	11	10	2.4	20	202	42.2	No	8	2	Absent	Resp Fail	MI	LFT	Absent	Survived
52	852258	2 to 4 wks	Covid	9	9	1.7	18	176	45.9	Yes	14	4	Present	Resp Fail	SHOCK	Absent	Absent	Death
53	741147	Less than 2 wks	Covid	12	13	1.9	21	188	45.4	No	9	2	Absent	Resp Fail	SHOCK	Vomit	Present	Survived
54	963369	2 to 4 wks	Covid	13	9	1.8	15	192	53.7	Yes	15	5	Present	Resp Fail	Arry	Vomit	Absent	Death
55	752257	Less than 2 wks	Covid	13	9	1.8	18	167	62.8	Yes	17	5	Absent	Resp Fail	MI	Absent	Absent	Death
56	763367	Less than 2 wks	Klebsiella	9	10	2.2	21	166	49.2	Yes	17	5	Absent	Embol	Absent	Vomit	Absent	Death
57	852418	2 to 4 wks	Tuberculous	14	10	2.1	18	176	55.7	Yes	15	3	Present	Resp Fail	SHOCK	Absent	Present	Survived
58	863258	Less than 2 wks	Covid	12	10	2.2	16	181	63.5	Yes	15	5	Present	Resp Fail	SHOCK	Absent	Absent	Death
59	965230	Less than 2 wks	Covid	12	10	1.2	13	156	50.7	No	6	3	Absent	Resp Fail	SHOCK	Absent	Absent	Survived
60	965552	2 to 4 wks	Covid	12	11	2.1	21	197	49.2	No	9	3	Present	Resp Fail	MI	Vomit	Absent	Survived
61	767675	2 to 4 wks	Covid	13	8	1.9	19	212	53.4	Yes	14	5	Absent	Resp Fail	MI	Absent	Absent	Death
62	757645	Less than 2 wks	Covid	13	10	2.2	21	206	57.2	No	7	1	Present	Resp Fail	SHOCK	Diaar	Absent	Survived

S No	MRD No.	Age (years)	Gender	Smoking	Biofuel exposure	Cough	Sputum	Fever	Shortness of breath	chest pain	Hemoptysis	Others	Diabetes	HTN	CKD	CAD	Obstructive airway disease	Past H of TB	URTI	Lung path	Radiologic
63	737343	69	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Present	Present	Present	Present	Absent	Absent	Present	Present	Interstitial
64	727278	64	Male	Absent	Absent	Present	Present	Present	Absent	absent	Present	Present	Present	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobular
65	797671	62	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Present	Present	Absent	Present	Absent	Absent	Absent	Interstitial
66	1000780	61	Female	Absent	Present	Present	Present	Present	Present	Present	absent	absent	Present	Absent	Present	Present	Absent	Present	Present	Present	Interstitial
67	791012	63	Male	Present	Absent	Present	Present	Present	Present	absent	absent	Present	Present	Present	Present	Absent	Present	Absent	Present	Present	Lobular
68	985756	39	Male	Absent	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
69	987621	38	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Present	Absent	Absent	Absent	Absent	Present	Present	Lobular
70	876212	37	Male	Absent	Absent	Present	Present	Present	Present	Present	Present	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Lobular
71	931690	39	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
72	307260	54	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	Present	Present	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
73	921650	56	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Present	Present	Absent	Absent	Absent	Present	Present	Interstitial
74	965782	51	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Present	Present	Present	Absent	Absent	Absent	Present	Present	Lobular
75	994562	53	Female	Absent	Absent	Present	Present	Present	Absent	Present	Present	absent	Absent	Present	Absent	Absent	Absent	Absent	Present	Absent	Lobar
76	991711	56	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Present	Absent	Absent	Absent	Absent	Present	Absent	Lobular
77	1000171	34	Male	Present	Absent	Present	Present	Present	Present	Present	absent	Present	Absent	Absent	Absent	Absent	Present	Present	Absent	Absent	Interstitial
78	917815	34	Female	Absent	Present	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
79	911170	38	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Present	Interstitial
80	911150	39	Male	Absent	Absent	Present	Present	Present	Present	Present	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
81	1000020	35	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Interstitial
82	741711	34	Female	Absent	Present	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobular
83	763131	35	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Interstitial
84	720102	39	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	Present	Absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
85	895000	35	Female	Absent	Present	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
86	823100	39	Male	Present	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Lobar
87	851111	38	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Present	Present	Present	Absent	Lobar
88	742098	35	Female	Absent	Absent	Present	Present	Present	Absent	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Interstitial
89	540289	39	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Present	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
90	7801230	38	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Present	Lobular
91	1000489	37	Female	Absent	Present	Present	Present	Present	Absent	Present	Present	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
92	78123	34	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
93	792130	34	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobular
94	750123	38	Male	Absent	Absent	Present	Present	Present	Absent	absent	Present	absent	Absent	Present	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
95	810230	39	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent	Lobar
96	830120	35	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	Present	Absent	Present	Absent	Absent	Absent	Present	Present	Present	Interstitial
97	860120	34	Male	Absent	Absent	Present	Present	Present	Absent	Present	Present	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Present	Interstitial
98	896210	35	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
99	841200	46	Female	Absent	Present	Present	Absent	Present	Present	Present	absent	absent	Present	Present	Absent	Absent	Absent	Absent	Present	Present	Interstitial
100	785520	48	Male	Absent	Absent	Present	Present	Present	Absent	absent	absent	Present	Present	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
101	1000025	49	Male	Present	Absent	Present	Present	Present	Present	absent	Present	absent	Present	Present	Absent	Absent	Absent	Absent	Present	Present	Lobular
102	830123	48	Female	Absent	Absent	Present	Present	Present	Absent	Present	absent	absent	Present	Present	Absent	Absent	Absent	Present	Present	Absent	Interstitial
103	831711	47	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobar
104	839216	48	Male	Absent	Absent	Present	Present	Present	Present	Present	Present	absent	Present	Present	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
105	893165	49	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	absent	Present	Present	Absent	Absent	Present	Absent	Present	Present	Interstitial
106	842424	48	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Present	Absent	Absent	Absent	Absent	Present	Present	Interstitial
107	875742	47	Male	Absent	Absent	Present	Present	Present	Absent	absent	absent	absent	Present	Present	Absent	Absent	Absent	Absent	Present	Present	Interstitial
108	986720	49	Male	Present	Absent	Present	Present	Present	Present	absent	absent	Present	Present	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
109	976521	48	Female	Absent	Present	Present	Present	Present	Absent	Present	Present	absent	Present	Present	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
110	985600	48	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Lobular
111	754809	49	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
112	541203	64	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Present	Absent	Present	Present	Absent	Absent	Present	Absent	Interstitial
113	781203	67	Male	Absent	Absent	Present	Present	Present	Present	Present	Present	absent	Present	Absent	Present	Absent	Absent	Absent	Present	Absent	Interstitial
114	781000	68	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Present	Absent	Present	Absent	Absent	Absent	Present	Absent	Lobular
115	789630	64	Female	Absent	Present	Present	Present	Present	Absent	Present	absent	absent	Present	Absent	Absent	Absent	Present	Present	Absent	Absent	Lobular
116	786301	65	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Present	Present	Absent	Absent	Absent	Absent	Absent	Interstitial
117	763042	62	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Present	Present	Absent	Absent	Present	Absent	Interstitial
118	730480	63	Female	Absent	Absent	Present	Present	Present	Absent	Present	Present	absent	Absent	Present	Present	Absent	Absent	Absent	Present	Present	Lobar
119	701560	48	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Present	Absent	Absent	Present	Present	Present	Absent	Interstitial
120	741023	47	Male	Absent	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
121	710243	49	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
122	721489	48	Female	Absent	Present	Present	Present	Present	Present	Present	Present	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent	Interstitial
123	87898	47	Male	Present	Absent	Present	Absent	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
124	545098	48	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial

S No	MRD No.	Duration of illness	Etiology	Hb	TLC (10*9)	Platelet count	S creat	RBS	CRP	Mechanical ventilation	Hospital stay (days)	PSI Grading	ICU admission	Pulmonary Complications	CVS Complications	GIT Complications	Haematological complications	Outcome
63	737343	2 to 4 wks	Covid	8	10	2.3	18	184	50.1	No	11	3	Present	Resp Fail	SHOCK	Absent	Absent	Death
64	727278	Less than 2 wks	Covid	13	9	2.3	21	166	49.8	No	8	2	Present	Resp Fail	SHOCK	Absent	Absent	Survived
65	797671	2 to 4 wks	Covid	14	9	1.7	18	188	59	Yes	15	4	Present	Resp Fail	MI	Absent	Absent	Death
66	1000780	Less than 2 wks	Covid	10	9	2.1	21	143	52.5	Yes	16	5	Present	Absent	Absent	Vomit	Present	Death
67	791012	2 to 4 wks	Covid	14	12	2.1	17	169	48.6	Yes	16	5	Present	Resp Fail	Arry	Vomit	Absent	Death
68	985756	2 to 4 wks	Covid	12	10	2.1	12	165	59.6	Yes	15	3	Present	Resp Fail	SHOCK	Absent	Absent	Death
69	987621	2 to 4 wks	Covid	9	10	1.8	20	187	46.5	No	7	1	Present	Resp Fail	Arry	Absent	Absent	Survived
70	876212	More than 4 wks	Unknown	8	12	2.1	21	166	63.4	Yes	15	5	Present	Absent	Absent	LFT	Absent	Death
71	931690	2 to 4 wks	Klebsiella	13	10	2.2	19	203	45.9	No	8	3	Absent	Embol	SHOCK	Vomit	Absent	Survived
72	307260	More than 4 wks	Covid	12	10	1.7	19	200	45.4	No	9	2	Present	Resp Fail	SHOCK	Vomit	Absent	Survived
73	921650	2 to 4 wks	Covid	8	10	1.9	18	175	59.5	No	8	5	Present	Resp Fail	SHOCK	Absent	Present	Death
74	965782	More than 4 wks	Covid	10	11	2.2	18	178	43.9	Yes	8	3	Present	Resp Fail	SHOCK	Vomit	Absent	Survived
75	994562	2 to 4 wks	Klebsiella	13	12	2.5	21	175	59.8	No	5	2	Present	Absent	SHOCK	Absent	Absent	Survived
76	991711	Less than 2 wks	Klebsiella	14	10	2.8	19	190	60.2	Yes	16	5	Absent	Embol	MI	Vomit	Absent	Death
77	1000171	2 to 4 wks	Unknown	12	10	1.8	18	186	58.7	Yes	16	3	Present	Resp Fail	SHOCK	LFT	Absent	Survived
78	917815	More than 4 wks	Covid	13	10	2.3	18	167	58.1	Yes	16	3	Present	Resp Fail	SHOCK	Absent	Absent	Survived
79	911170	Less than 2 wks	Covid	12	9	1.9	19	167	45.7	No	9	2	Present	Resp Fail	SHOCK	Absent	Absent	Survived
80	911150	2 to 4 wks	Covid	13	12	2.4	22	184	63.7	No	7	5	Present	Resp Fail	SHOCK	Absent	Absent	Death
81	1000020	Less than 2 wks	Covid	13	10	1.9	23	176	49.9	Yes	16	3	Present	Resp Fail	MI	Absent	Absent	Death
82	741711	2 to 4 wks	Unknown	11	9	2.3	21	187	45.8	No	9	1	Absent	Resp Fail	Absent	Absent	Present	Survived
83	763131	Less than 2 wks	Covid	13	13	1.9	21	207	45.6	No	9	4	Present	Resp Fail	SHOCK	LFT	Absent	Survived
84	720102	2 to 4 wks	Covid	12	9	2.1	17	177	58.9	Yes	15	1	Present	Resp Fail	SHOCK	Absent	Absent	Survived
85	895000	Less than 2 wks	Covid	10	12	3.2	18	178	62.8	Yes	15	4	Present	Resp Fail	MI	Vomit	Present	Survived
86	823100	2 to 4 wks	Klebsiella	10	9	2	19	208	45.8	Yes	16	5	Absent	Embol	Absent	Diaar	Absent	Death
87	851111	2 to 4 wks	Tuberculous	12	10	3.5	15	204	42.5	Yes	16	2	Present	Resp Fail	Arry	Absent	Absent	Survived
88	742098	Less than 2 wks	Covid	12	12	2.1	21	186	46.8	Yes	16	5	Present	Resp Fail	SHOCK	Absent	Absent	Death
89	540289	2 to 4 wks	Covid	12	9	1.8	18	184	49.5	No	8	5	Present	Resp Fail	SHOCK	Absent	Absent	Death
90	7801230	More than 4 wks	Covid	10	10	2.4	15	168	53.7	Yes	9	5	Present	Resp Fail	SHOCK	Diaar	Absent	Survived
91	1000489	2 to 4 wks	Klebsiella	10	10	2	18	184	63.1	No	8	1	Absent	Embol	Absent	Absent	Present	Survived
92	78123	2 to 4 wks	Covid	12	10	3.2	17	201	46.4	No	10	4	Present	Resp Fail	MI	Absent	Absent	Death
93	792130	More than 4 wks	Tuberculous	10	10	1.6	14	176	48.9	Yes	15	5	Absent	Resp Fail	SHOCK	Diaar	Present	Survived
94	750123	2 to 4 wks	Covid	12	8	1.9	12	210	50.4	No	10	2	Present	Absent	Absent	Absent	Absent	Survived
95	810230	2 to 4 wks	Klebsiella	13	11	2.3	20	165	58.5	No	8	5	Absent	Absent	SHOCK	Absent	Absent	Death
96	830120	More than 4 wks	Covid	12	10	1.8	20	175	45.5	Yes	15	3	Present	Resp Fail	SHOCK	Vomit	Absent	Survived
97	860120	2 to 4 wks	Covid	10	12	2.6	16	186	51.9	Yes	8	2	Present	Resp Fail	SHOCK	Diaar	Absent	Survived
98	896210	More than 4 wks	Covid	12	8	1.8	16	191	48.9	Yes	17	5	Present	Resp Fail	SHOCK	Absent	Present	Death
99	841200	2 to 4 wks	Covid	12	9	2.1	21	185	46.2	Yes	15	5	Present	Resp Fail	MI	Absent	Absent	Death
100	785520	More than 4 wks	Covid	10	11	1.8	18	165	59.8	No	6	3	Present	Resp Fail	SHOCK	Absent	Absent	Death
101	1000025	2 to 4 wks	Covid	9	10	2.8	15	187	59.8	Yes	7	1	Present	Resp Fail	SHOCK	Vomit	Absent	Survived
102	830123	2 to 4 wks	Covid	12	10	3.2	18	198	59.3	No	7	2	Present	Resp Fail	Arry	Absent	Absent	Survived
103	831711	More than 4 wks	Tuberculous	13	12	2.2	19	193	57.7	No	7	4	Absent	Resp Fail	SHOCK	Absent	Absent	Death
104	839216	2 to 4 wks	Covid	10	10	2.2	20	168	45.9	Yes	17	5	Present	Resp Fail	MI	Vomit	Absent	Death
105	893165	Less than 2 wks	Covid	11	10	3.5	18	178	52.8	No	8	2	Present	Resp Fail	Arry	Absent	Absent	Survived
106	842424	More than 4 wks	Covid	13	9	1.8	18	144	44.2	Yes	15	5	Present	Resp Fail	SHOCK	Absent	Present	Death
107	875742	2 to 4 wks	Covid	12	13	2.6	14	230	51.5	No	8	2	Present	Absent	SHOCK	LFT	Absent	Survived
108	986720	Less than 2 wks	Covid	9	12	1.9	16	187	54.1	No	9	2	Present	Resp Fail	Arry	Absent	Absent	Survived
109	976521	More than 4 wks	Covid	13	10	2.4	19	178	54.6	Yes	16	4	Present	Resp Fail	Arry	Bleedin	Absent	Death
110	985600	2 to 4 wks	Covid	13	9	2.2	12	182	54.1	No	5	2	Present	Resp Fail	MI	Absent	Absent	Death
111	754809	Less than 2 wks	Covid	12	8	2.1	20	195	57.5	No	12	3	Present	Resp Fail	SHOCK	Absent	Absent	Death
112	541203	Less than 2 wks	Covid	12	8	1.6	16	181	64.1	No	5	1	Absent	Resp Fail	Arry	LFT	Present	Survived
113	781203	2 to 4 wks	Covid	9	10	1.8	16	176	56.9	No	8	3	Present	Resp Fail	Arry	Absent	Absent	Survived
114	781000	Less than 2 wks	Covid	13	10	1.8	17	184	52.8	Yes	15	5	Present	Resp Fail	SHOCK	LFT	Present	Death
115	789630	More than 4 wks	Tuberculous	12	13	2.3	18	205	46.2	No	7	4	Present	Resp Fail	SHOCK	Vomit	Absent	Survived
116	786301	2 to 4 wks	Covid	12	10	1.2	16	186	53.5	No	5	1	Present	Resp Fail	SHOCK	Absent	Absent	Survived
117	763042	Less than 2 wks	Covid	12	10	2	20	198	48.7	Yes	15	5	Present	Absent	Absent	Diaar	Absent	Death
118	730480	Less than 2 wks	Klebsiella	9	10	1.2	19	189	47.5	Yes	16	4	Present	Embol	MI	Diaar	Absent	Death
119	701560	2 to 4 wks	Covid	14	13	2.2	20	207	45.5	No	9	2	Present	Resp Fail	Absent	Absent	Absent	Survived
120	741023	2 to 4 wks	Covid	9	10	2.2	18	208	45.1	No	8	2	Absent	Resp Fail	SHOCK	Absent	Absent	Survived
121	710243	Less than 2 wks	Covid	9	11	1.8	19	174	58	Yes	17	5	Present	Resp Fail	SHOCK	Absent	Absent	Death
122	721489	2 to 4 wks	Covid	9	10	2.1	21	193	54.8	No	8	3	Absent	Resp Fail	Absent	Bleedin	Absent	Survived
123	87898	2 to 4 wks	Covid	12	9	3.2	18	195	49.5	No	7	2	Absent	Resp Fail	Absent	Vomit	Present	Survived
124	545098	Less than 2 wks	Covid	8	10	1.9	15	178	48.6	No	15	1	Absent	Resp Fail	Absent	Absent	Absent	Survived

S No	MRD No.	Age (years)	Gender	Smoking	Biofuel exposure	Cough	Sputum	Fever	Shortness of breath	chest pain	Hemoptysis	Others	Diabetes	HTN	CKD	CAD	Obstructive airway disease	Past H of TB	URTI	Lung path	Radiologic
125	565456	49	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
126	821232	46	Male	Absent	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Present	Absent	Absent	Present	Absent	Present	Absent	Interstitial
127	801478	45	Male	Present	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Lobular
128	852980	48	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Interstitial
129	854790	43	Male	Absent	Absent	Present	Present	Present	Absent	Present	Present	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent	Interstitial
130	898054	42	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
131	849620	46	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Lobar
132	897062	48	Female	Absent	Present	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
133	985611	43	Male	Absent	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent	Interstitial
134	479546	42	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
135	987564	46	Female	Absent	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
136	989852	48	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
137	759632	47	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobular
138	742632	49	Female	Absent	Present	Present	Absent	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Interstitial
139	746310	48	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
140	963160	47	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
141	982073	46	Female	Absent	Absent	Present	Present	Present	Absent	absent	Present	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent	Interstitial
142	959403	42	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
143	974101	43	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
144	979064	46	Female	Absent	Present	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
145	1000010	48	Male	Present	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
146	456808	47	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
147	778895	45	Female	Absent	Present	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Interstitial
148	1002301	46	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
149	784922	49	Female	Absent	Absent	Present	Present	Present	Present	Present	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
150	799503	48	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
151	798320	48	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
152	711749	47	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
153	798307	48	Male	Present	Absent	Present	Present	Present	Absent	absent	Present	absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
154	898098	46	Female	Absent	Present	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Interstitial
155	895612	42	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
156	749846	46	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent	Interstitial
157	795520	48	Female	Absent	Present	Present	Present	Present	Absent	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
158	785554	47	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
159	799978	42	Male	Present	Absent	Present	Absent	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
160	799800	41	Female	Absent	Present	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
161	798456	51	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Interstitial
162	796649	56	Male	Present	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
163	778520	54	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
164	884490	56	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
165	847560	54	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
166	889990	56	Male	Absent	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
167	899900	59	Female	Absent	Present	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
168	999880	58	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Interstitial
169	884410	57	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Present	Lobar
170	966555	56	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
171	955623	59	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
172	978960	58	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
173	898908	57	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
174	958909	56	Male	Absent	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
175	980985	51	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
176	778510	53	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
177	545660	56	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Present	Absent	Absent	Present	Absent	Interstitial
178	844115	54	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
179	887756	56	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Interstitial
180	454566	59	Female	Absent	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Present	Absent	Absent	Absent	Absent	Present	Present	Interstitial
181	885445	58	Male	Present	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Present	Absent	Absent	Present	Absent	Interstitial
182	979898	59	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Present	Absent	Absent	Present	Absent	Interstitial
183	989898	54	Female	Absent	Present	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Present	Absent	Absent	Present	Absent	Interstitial
184	989899	56	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
185	979799	51	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
186	774550	53	Female	Absent	Present	Present	Present	Present	Absent	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial

S No	MRD No.	Duration of illness	Etiology	Hb	TLC (10*9)	Platelet count	S creat	RBS	CRP	Mechanical ventilation	Hospital stay (days)	PSI Grading	ICU admission	Pulmonary Complications	CVS Complications	GIT Complications	Haematological complications	Outcome
125	565456	Less than 2 wks	Covid	13	12	2.2	16	188	55.1	Yes	17	3	Present	Absent	Arry	Absent	Absent	Death
126	821232	2 to 4 wks	Covid	9	10	2.3	15	184	53.2	No	9	3	Present	Resp Fail	SHOCK	Absent	Present	Survived
127	801478	Less than 2 wks	Klebsiella	13	10	1.6	16	177	52.2	Yes	16	4	Present	Embol	SHOCK	Absent	Absent	Death
128	852980	Less than 2 wks	Covid	9	10	2	19	218	45.6	No	9	5	Present	Resp Fail	SHOCK	Absent	Absent	Death
129	854790	2 to 4 wks	Covid	13	10	2.2	16	186	49.5	Yes	15	5	Present	Resp Fail	Absent	LFT	Absent	Death
130	898054	Less than 2 wks	Covid	8	12	2.1	19	196	43.1	Yes	15	5	Present	Resp Fail	SHOCK	Absent	Present	Death
131	849620	Less than 2 wks	Tuberculous	13	9	2.5	19	185	60.1	Yes	15	3	Absent	Embol	SHOCK	Absent	Present	Death
132	897062	2 to 4 wks	Covid	10	12	1.8	18	174	49.5	No	8	5	Present	Resp Fail	MI	LFT	Absent	Survived
133	985611	Less than 2 wks	Covid	9	10	2.3	17	169	48.1	No	9	3	Present	Resp Fail	Absent	Absent	Absent	Survived
134	479546	Less than 2 wks	Covid	12	8	2.2	13	175	46.2	No	8	2	Present	Absent	Arry	Absent	Absent	Survived
135	987564	2 to 4 wks	Covid	9	10	2.2	23	182	70.4	No	9	2	Absent	Resp Fail	Absent	Vomit	Absent	Survived
136	989852	Less than 2 wks	Covid	11	13	1.2	21	187	46.1	No	9	1	Present	Resp Fail	Absent	Absent	Absent	Survived
137	759632	Less than 2 wks	Unknown	9	8	1.8	20	204	45.2	Yes	15	5	Absent	Resp Fail	Absent	Vomit	Absent	Death
138	742632	2 to 4 wks	Covid	12	9	2.2	15	151	44.8	Yes	14	4	Absent	Resp Fail	Absent	LFT	Absent	Death
139	746310	Less than 2 wks	Covid	10	10	2.2	20	179	58.9	Yes	15	5	Present	Resp Fail	MI	Vomit	Absent	Death
140	963160	Less than 2 wks	Covid	14	10	2.9	15	189	57.8	No	8	2	Present	Resp Fail	Absent	Absent	Absent	Survived
141	982073	2 to 4 wks	Covid	14	10	2.2	20	217	47	No	8	2	Present	Resp Fail	Absent	Absent	Absent	Survived
142	959403	Less than 2 wks	Covid	10	10	2.3	18	157	60.4	No	9	2	Present	Absent	Absent	Vomit	Absent	Survived
143	974101	Less than 2 wks	Covid	14	12	3.2	16	199	45.8	No	8	2	Present	Resp Fail	MI	Absent	Absent	Survived
144	979064	2 to 4 wks	Covid	8	10	1.8	18	215	48.2	No	7	1	Present	Resp Fail	Absent	Absent	Absent	Survived
145	1000010	Less than 2 wks	Covid	9	11	2.1	21	205	58.9	Yes	17	5	Present	Resp Fail	Absent	Absent	Absent	Death
146	456808	Less than 2 wks	Covid	12	9	2	18	197	48.6	Yes	17	5	Present	Resp Fail	Absent	Vomit	Absent	Death
147	778895	2 to 4 wks	Covid	14	9	2.3	18	197	59.2	Yes	17	5	Present	Resp Fail	MI	Absent	Absent	Death
148	1002301	Less than 2 wks	Covid	9	11	2	21	193	52	Yes	15	5	Present	Resp Fail	Absent	Bleedin	Absent	Death
149	784922	Less than 2 wks	Covid	10	12	2.2	21	182	60.7	No	10	2	Present	Resp Fail	Absent	Absent	Present	Survived
150	799503	2 to 4 wks	Covid	8	10	2.4	19	185	53.5	No	10	1	Present	Resp Fail	Absent	Absent	Absent	Survived
151	798320	Less than 2 wks	Covid	9	10	1.9	19	188	52.9	Yes	17	5	Present	Resp Fail	MI	LFT	Present	Death
152	711749	2 to 4 wks	Covid	9	11	1.9	20	213	52.5	No	10	4	Present	Resp Fail	Absent	Absent	Absent	Survived
153	798307	More than 4 wks	Covid	12	12	2.3	18	186	52.8	No	9	2	Present	Resp Fail	Absent	Absent	Absent	Survived
154	898098	2 to 4 wks	Covid	10	10	2.1	20	173	53.4	No	8	1	Present	Resp Fail	Absent	Vomit	Absent	Survived
155	895612	Less than 2 wks	Covid	14	8	2.1	13	215	53.7	No	6	3	Absent	Resp Fail	MI	Absent	Absent	Death
156	749846	2 to 4 wks	Covid	12	9	2.3	15	187	58.5	No	7	1	Present	Absent	Absent	Absent	Absent	Survived
157	795520	More than 4 wks	Covid	13	10	2.8	15	185	60.1	No	9	2	Present	Resp Fail	SHOCK	Diaar	Absent	Survived
158	785554	2 to 4 wks	Covid	11	10	2	20	174	59.2	No	10	5	Present	Resp Fail	Absent	Absent	Absent	Death
159	799978	Less than 2 wks	Covid	9	10	2.3	18	191	58.2	Yes	15	5	Absent	Resp Fail	Arry	Diaar	Absent	Death
160	799800	2 to 4 wks	Covid	13	9	2.1	20	189	47.6	Yes	15	4	Present	Resp Fail	Absent	LFT	Absent	Death
161	798456	Less than 2 wks	Covid	10	11	1.8	21	203	45.9	No	8	3	Absent	Resp Fail	SHOCK	Absent	Absent	Survived
162	796649	2 to 4 wks	Covid	10	12	2.3	20	218	54.8	Yes	15	4	Present	Resp Fail	Arry	Vomit	Absent	Death
163	778520	Less than 2 wks	Covid	12	8	2	20	190	54.3	No	8	5	Present	Resp Fail	Absent	Absent	Absent	Death
164	884490	2 to 4 wks	Covid	13	13	2.9	15	177	47.2	No	9	3	Absent	Resp Fail	SHOCK	Vomit	Present	Survived
165	847560	Less than 2 wks	Covid	12	12	1.9	15	197	56.6	Yes	16	5	Present	Resp Fail	SHOCK	Diaar	Present	Death
166	889990	Less than 2 wks	Covid	13	9	2.3	21	191	60.5	Yes	18	4	Absent	Resp Fail	Absent	Absent	Absent	Death
167	899900	2 to 4 wks	Klebsiella	13	9	1.8	13	202	49.5	No	7	5	Present	Embol	MI	Absent	Absent	Death
168	999880	Less than 2 wks	Covid	9	10	1.8	17	213	51.8	No	9	2	Present	Resp Fail	Absent	Absent	Absent	Survived
169	884410	Less than 2 wks	Klebsiella	13	10	3.2	17	202	47.3	No	10	5	Present	Embol	MI	Absent	Absent	Death
170	966555	Less than 2 wks	Influenza	13	13	2.1	18	186	46.2	Yes	15	5	Absent	Embol	Absent	Absent	Absent	Death
171	955623	Less than 2 wks	Covid	12	10	1.8	17	179	54.6	No	7	2	Present	Resp Fail	SHOCK	Absent	Absent	Survived
172	978960	Less than 2 wks	Covid	13	10	2.8	15	195	60.1	Yes	8	5	Present	Resp Fail	SHOCK	Vomit	Absent	Death
173	898908	Less than 2 wks	Klebsiella	13	8	2.1	12	175	49.5	Yes	14	3	Absent	Embol	Absent	Absent	Present	Death
174	958909	Less than 2 wks	Influenza	9	12	1.8	20	202	46.9	Yes	15	5	Absent	Absent	MI	LFT	Absent	Death
175	980985	Less than 2 wks	Covid	10	10	1.8	18	196	63.8	Yes	17	5	Present	Resp Fail	Absent	Vomit	Absent	Death
176	778510	2 to 4 wks	Covid	10	12	2.1	18	216	53.1	No	9	3	Present	Resp Fail	Absent	Absent	Absent	Survived
177	545660	Less than 2 wks	Covid	13	8	1.8	21	215	48.9	Yes	16	4	Present	Resp Fail	Absent	LFT	Present	Death
178	844115	2 to 4 wks	Covid	9	10	2.2	23	198	46.2	No	9	5	Present	Resp Fail	SHOCK	Absent	Absent	Death
179	887756	Less than 2 wks	Covid	10	12	2.2	21	176	47.5	No	9	1	Present	Resp Fail	SHOCK	Absent	Absent	Survived
180	454566	Less than 2 wks	Influenza	8	11	1.8	21	176	60.4	Yes	15	5	Absent	Embol	Absent	Diaar	Absent	Death
181	885445	2 to 4 wks	Covid	12	8	1.8	18	199	55	No	8	3	Present	Resp Fail	Absent	Absent	Absent	Survived
182	979898	2 to 4 wks	Covid	13	10	3.2	15	196	45.7	No	8	5	Present	Resp Fail	MI	Absent	Present	Death
183	989898	Less than 2 wks	Covid	12	10	4.6	16	174	46.2	No	9	5	Present	Resp Fail	MI	Absent	Absent	Death
184	989899	More than 4 wks	Covid	12	9	1.6	16	167	49.2	No	8	3	Present	Resp Fail	Absent	Absent	Present	Survived
185	979799	Less than 2 wks	Covid	12	12	1.9	19	152	58.4	No	7	2	Present	Resp Fail	Absent	Vomit	Absent	Survived
186	774550	2 to 4 wks	Covid	10	12	2.4	17	190	57.5	No	8	4	Present	Resp Fail	Arry	Vomit	Absent	Survived

S No	MRD No.	Age (years)	Gender	Smoking	Biofuel exposure	Cough	Sputum	Fever	Shortness of breath	chest pain	Hemoptysis	Others	Diabetes	HTN	CKD	CAD	Obstructive airway disease	Past H of TB	URTI	Lung path	Radiologic
187	996358	52	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
188	749889	56	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Interstitial
189	989790	59	Female	Absent	Present	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
190	998989	58	Male	Absent	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
191	797655	54	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
192	994455	57	Male	Absent	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
193	1000023	58	Male	Present	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
194	1000017	56	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
195	784139	51	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Interstitial
196	463259	56	Male	Present	Absent	Present	Present	Present	Present	Present	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
197	741102	54	Female	Absent	Present	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
198	756320	59	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
199	899763	58	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
200	785662	54	Female	Absent	Absent	Present	Present	Present	Present	absent	Present	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
201	778950	51	Male	Present	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
202	788552	56	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
203	754612	54	Male	Present	Absent	Present	Present	Present	Present	Present	Present	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Interstitial
204	989890	56	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
205	779809	54	Female	Absent	Present	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
206	777909	56	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
207	798900	59	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Present	Absent	Present	Absent	Interstitial
208	774650	58	Female	Absent	Present	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
209	797906	57	Male	Present	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
210	799704	56	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
211	998900	59	Female	Absent	Absent	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Interstitial
212	797980	67	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
213	798620	69	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
214	798501	64	Female	Absent	Present	Present	Present	Present	Absent	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
215	999707	62	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Present	Absent	Absent	Present	Absent	Lobular
216	797906	61	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
217	797076	63	Female	Absent	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
218	797664	63	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
219	797466	65	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
220	79900	64	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
221	799795	67	Female	Absent	Present	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Present	Absent	Absent	Absent	Absent	Lobar
222	777979	56	Male	Present	Absent	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Interstitial
223	799900	54	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
224	965550	56	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
225	885666	59	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
226	884465	58	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
227	875232	59	Female	Absent	Present	Present	Present	Present	Absent	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
228	898990	54	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
229	897034	56	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
230	798097	62	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
231	979765	65	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
232	799898	64	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
233	976500	67	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
234	789899	64	Female	Absent	Present	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
235	781225	65	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Present	Absent	Absent	Present	Absent	Lobular
236	765460	64	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Present	Interstitial
237	977911	64	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
238	799904	70	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
239	779802	76	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
240	763110	68	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
241	765650	67	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
242	799001	64	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Present	Absent	Absent	Absent	Present	Absent	Lobular
243	798906	67	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Present	Absent	Absent	Absent	Absent	Absent	Lobar
244	589802	71	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
245	588989	76	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
246	775212	68	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
247	798980	67	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
248	745520	64	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Present	Absent	Absent	Present	Absent	Absent	Lobar

S No	MRD No.	Duration of illness	Etiology	Hb	TLC (10*9)	Platelet count	S creat	RBS	CRP	Mechanical ventilation	Hospital stay (days)	PSI Grading	ICU admission	Pulmonary Complications	CVS Complications	GIT Complications	Haematological complications	Outcome
187	996358	More than 4 wks	Covid	10	10	1.8	20	177	48.1	No	9	3	Present	Resp Fail	SHOCK	Absent	Present	Survived
188	749889	Less than 2 wks	Covid	14	10	2.1	12	172	52.1	No	5	2	Present	Resp Fail	MI	Absent	Absent	Survived
189	989790	2 to 4 wks	Covid	11	10	1.9	15	183	49.2	Yes	15	4	Present	Resp Fail	SHOCK	Absent	Absent	Death
190	998989	More than 4 wks	Covid	9	12	1.9	18	194	59.5	No	8	4	Present	Resp Fail	SHOCK	Absent	Absent	Death
191	797655	2 to 4 wks	Covid	12	12	1.8	21	196	57.4	Yes	16	5	Present	Resp Fail	MI	Vomit	Present	Death
192	994455	More than 4 wks	Covid	12	11	1.8	23	192	52.6	Yes	17	4	Present	Resp Fail	SHOCK	Absent	Present	Death
193	1000023	Less than 2 wks	Covid	10	10	2.6	16	188	63.1	No	9	2	Present	Resp Fail	Arry	Vomit	Present	Survived
194	1000017	2 to 4 wks	Covid	12	9	1.9	14	196	61.1	No	9	2	Present	Resp Fail	Arry	Absent	Absent	Survived
195	784139	Less than 2 wks	Covid	12	9	2.1	19	177	57.7	Yes	15	5	Present	Resp Fail	MI	Absent	Absent	Death
196	463259	Less than 2 wks	Covid	13	10	4.6	17	154	63.4	Yes	9	2	Present	Resp Fail	SHOCK	LFT	Absent	Survived
197	741102	2 to 4 wks	Covid	12	13	3.2	23	204	57.1	Yes	15	4	Absent	Resp Fail	Arry	Absent	Absent	Death
198	756320	Less than 2 wks	Covid	9	10	2.2	18	175	51.2	Yes	17	4	Present	Resp Fail	Arry	Bleedin	Absent	Death
199	899763	More than 4 wks	Unknown	12	11	2.8	18	206	45.9	No	9	2	Present	Embol	SHOCK	Absent	Absent	Survived
200	785662	2 to 4 wks	Covid	8	10	1.2	22	183	60.8	No	7	4	Absent	Resp Fail	MI	LFT	Absent	Survived
201	778950	More than 4 wks	Covid	8	10	2.3	17	203	58.2	Yes	16	4	Absent	Resp Fail	SHOCK	Absent	Absent	Death
202	788552	Less than 2 wks	Covid	13	9	2.2	15	173	61	No	9	2	Present	Resp Fail	Arry	Absent	Absent	Survived
203	754612	2 to 4 wks	Covid	11	9	2.1	21	176	45.1	Yes	17	5	Present	Absent	Absent	Bleedin	Absent	Death
204	989890	More than 4 wks	Covid	14	9	2.3	12	176	46	No	9	4	Absent	Resp Fail	Arry	Absent	Absent	Death
205	779809	More than 4 wks	Covid	13	13	2.2	12	204	53.5	Yes	15	5	Present	Resp Fail	SHOCK	LFT	Present	Death
206	777909	2 to 4 wks	Covid	9	11	2.1	16	213	55.4	Yes	15	3	Absent	Resp Fail	SHOCK	Absent	Absent	Survived
207	798900	More than 4 wks	Unknown	9	10	2.3	23	166	50.2	Yes	16	5	Present	Embol	Absent	LFT	Present	Death
208	774650	Less than 2 wks	Covid	9	9	2.5	18	197	59.9	Yes	16	4	Present	Resp Fail	Arry	LFT	Absent	Death
209	797906	More than 4 wks	Covid	9	10	2.3	18	200	57.4	No	7	4	Present	Resp Fail	SHOCK	Absent	Absent	Death
210	799704	2 to 4 wks	Covid	9	10	2.2	18	203	54.7	No	8	2	Absent	Resp Fail	SHOCK	Absent	Absent	Survived
211	998900	More than 4 wks	Covid	12	9	2.2	12	205	49.5	No	9	1	Present	Resp Fail	Arry	Absent	Absent	Survived
212	797980	Less than 2 wks	Covid	14	12	3.2	14	178	48.9	No	8	3	Present	Resp Fail	SHOCK	Diaar	Absent	Survived
213	798620	2 to 4 wks	Covid	10	10	2.3	19	183	53.1	Yes	17	4	Present	Resp Fail	SHOCK	Absent	Absent	Death
214	798501	More than 4 wks	Covid	8	12	1.8	18	173	53.8	Yes	15	3	Absent	Resp Fail	SHOCK	Absent	Present	Survived
215	999707	More than 4 wks	Tuberculous	13	12	2.1	12	212	54.4	No	8	3	Present	Absent	SHOCK	Absent	Absent	Death
216	797906	2 to 4 wks	Covid	12	10	2.9	18	189	64.3	No	8	1	Present	Resp Fail	Arry	Vomit	Absent	Survived
217	797076	Less than 2 wks	Covid	12	10	2.1	20	189	60.4	Yes	15	4	Absent	Resp Fail	SHOCK	Absent	Absent	Death
218	797664	More than 4 wks	Covid	13	12	2.7	18	167	49.8	No	10	2	Present	Resp Fail	SHOCK	Vomit	Absent	Survived
219	797466	2 to 4 wks	Covid	12	12	2.3	21	175	46.7	No	7	5	Absent	Resp Fail	SHOCK	Absent	Absent	Death
220	79900	More than 4 wks	Covid	12	12	3.1	12	206	49.5	No	8	5	Present	Resp Fail	Arry	Absent	Absent	Death
221	799795	Less than 2 wks	Unknown	12	9	2	12	186	53.4	No	10	3	Present	Embol	Absent	Absent	Absent	Survived
222	777979	2 to 4 wks	Covid	9	10	1.2	17	183	53.4	No	9	5	Absent	Resp Fail	SHOCK	Absent	Present	Death
223	799900	More than 4 wks	Covid	12	10	2.2	18	198	57.9	Yes	17	5	Present	Resp Fail	SHOCK	Absent	Present	Death
224	965550	More than 4 wks	Covid	14	12	3.2	15	168	51.4	Yes	9	3	Absent	Resp Fail	SHOCK	LFT	Present	Survived
225	885666	2 to 4 wks	Covid	13	13	3.2	18	201	59.2	Yes	17	5	Present	Resp Fail	Arry	Absent	Absent	Death
226	884465	Less than 2 wks	Covid	12	11	3.2	16	195	56.9	Yes	7	4	Absent	Resp Fail	SHOCK	Diaar	Absent	Survived
227	875232	More than 4 wks	Covid	13	8	2.3	12	202	57.2	Yes	14	3	Present	Resp Fail	Absent	Absent	Absent	Death
228	898990	2 to 4 wks	Covid	13	10	2.1	16	216	49.8	No	8	5	Absent	Resp Fail	Arry	Absent	Absent	Death
229	897034	More than 4 wks	Covid	13	9	3.2	20	187	55.1	No	7	3	Present	Resp Fail	Arry	Vomit	Absent	Survived
230	798097	More than 4 wks	Covid	12	9	1.4	19	196	55.2	No	9	3	Absent	Resp Fail	SHOCK	Absent	Present	Death
231	979765	2 to 4 wks	Covid	12	10	2.1	19	177	48.9	No	10	3	Absent	Resp Fail	SHOCK	Vomit	Absent	Survived
232	799898	More than 4 wks	Covid	14	10	1.9	23	207	45.3	Yes	15	4	Present	Resp Fail	Absent	Diaar	Present	Death
233	976500	More than 4 wks	Covid	14	12	2	19	188	57.2	Yes	15	3	Absent	Resp Fail	SHOCK	Absent	Absent	Death
234	789899	2 to 4 wks	Covid	13	9	1.7	18	165	52.8	No	6	4	Present	Resp Fail	SHOCK	Absent	Absent	Death
235	781225	More than 4 wks	Unknown	10	11	2.2	15	187	59.3	No	8	1	Absent	Embol	Absent	Bleedin	Absent	Survived
236	765460	Less than 2 wks	Influenza	11	9	1.6	18	203	51.8	No	6	3	Absent	Resp Fail	Arry	Absent	Absent	Survived
237	977911	2 to 4 wks	Covid	12	10	1.8	23	175	63.1	No	9	2	Absent	Resp Fail	Absent	Absent	Absent	Survived
238	799904	More than 4 wks	Covid	8	8	2.3	20	187	64	No	8	2	Present	Resp Fail	Arry	Vomit	Absent	Survived
239	779802	2 to 4 wks	Covid	12	10	4.6	17	214	57.9	Yes	15	5	Absent	Resp Fail	Arry	Absent	Absent	Death
240	763110	Less than 2 wks	Covid	13	10	2	21	208	45.1	Yes	17	4	Present	Resp Fail	Absent	LFT	Absent	Death
241	765650	2 to 4 wks	Covid	12	10	3.2	24	184	51.5	Yes	16	5	Absent	Resp Fail	Arry	Absent	Absent	Death
242	799001	More than 4 wks	Klebsiella	12	13	2.3	20	173	47.8	No	7	5	Present	Absent	SHOCK	Absent	Absent	Death
243	798906	2 to 4 wks	Klebsiella	13	12	3.2	23	204	48.5	Yes	15	5	Absent	Embol	MI	Absent	Absent	Death
244	589802	More than 4 wks	Covid	14	9	2.3	13	182	60.7	No	7	3	Present	Resp Fail	Absent	Absent	Absent	Survived
245	588989	2 to 4 wks	Covid	12	10	2.1	18	189	41.9	Yes	15	2	Absent	Resp Fail	SHOCK	Absent	Absent	Survived
246	775212	More than 4 wks	Unknown	8	9	1.9	21	206	45.8	Yes	17	5	Present	Absent	Absent	Bleedin	Absent	Death
247	798980	2 to 4 wks	Covid	10	10	2.3	21	180	49.2	Yes	15	5	Absent	Resp Fail	Absent	Vomit	Absent	Death
248	745520	More than 4 wks	Klebsiella	10	12	1.8	16	185	49.5	Yes	15	5	Present	Embol	Absent	LFT	Absent	Death

S No	MRD No.	Age (years)	Gender	Smoking	Biofuel exposure	Cough	Sputum	Fever	Shortness of breath	chest pain	Hemoptysis	Others	Diabetes	HTN	CKD	CAD	Obstructive airway disease	Past H of TB	URTI	Lung path	Radiologic
249	585898	68	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Present	Absent	Absent	Absent	Present	Absent	Lobar
250	985262	67	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
251	799700	61	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
252	799007	67	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
253	776508	69	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
254	774550	63	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
255	798007	62	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Present	Present	Absent	Absent	Lobar
256	998808	61	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
257	588560	65	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
258	797804	65	Male	Present	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Present	Present	Present	Present	Absent	Lobar
259	776521	63	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
260	775662	65	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
261	776452	76	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
262	774411	72	Male	Present	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Present	Absent	Present	Absent	Absent	Present	Absent	Lobular
263	886630	76	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
264	889988	78	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Present	Absent	Present	Absent	Absent	Absent	Absent	Lobar
265	887700	62	Male	Present	Absent	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
266	844120	64	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
267	875209	71	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
268	874102	68	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
269	764310	64	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
270	754698	62	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobular
271	720158	63	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
272	764218	63	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
273	754810	65	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
274	774499	64	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
275	770022	63	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Present	Absent	Absent	Absent	Absent	Present	Absent	Lobar
276	777777	65	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
277	888881	68	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
278	998700	67	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
279	444402	62	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	Present	Present	Absent	Absent	Absent	Present	Present	Present	Absent	Lobar
280	774455	63	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
281	888888	68	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
282	744159	67	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
283	999109	64	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
284	999940	68	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
285	665588	67	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
286	778201	69	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
287	784502	64	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
288	898098	62	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
289	766620	61	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
290	773333	63	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	Present	Present	Absent	Absent	Absent	Absent	Absent	Present	Present	Lobar
291	774411	63	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Present	Present	Absent	Lobular
292	723025	65	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
293	798098	64	Female	Absent	Absent	Present	Present	Present	Present	Present	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
294	798550	67	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Lobar
295	799800	68	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
296	989800	64	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
297	988965	65	Male	Absent	Absent	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
298	799901	62	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Interstitial
299	797900	63	Female	Absent	Absent	Present	Present	Present	Present	absent	absent	absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Interstitial
300	799971	64	Male	Absent	Absent	Present	Present	Present	Present	Present	absent	absent	Present	Absent	Absent	Absent	Present	Absent	Present	Present	Lobar

S No	MRD No.	Duration of illness	Etiology	Hb	TLC (10*9)	Platelet count	S creat	RBS	CRP	Mechanical ventilation	Hospital stay (days)	PSI Grading	ICU admission	Pulmonary Complications	CVS Complications	GIT Complications	Haematological complications	Outcome
249	585898	2 to 4 wks	Klebsiella	12	10	2.1	23	213	49.3	No	8	3	Absent	Embol	SHOCK	Absent	Absent	Death
250	985262	Less than 2 wks	Covid	12	10	1.8	15	194	62.8	Yes	16	3	Present	Resp Fail	SHOCK	Absent	Absent	Death
251	799700	2 to 4 wks	Covid	13	10	2.6	18	167	52.9	No	7	3	Absent	Resp Fail	Absent	Absent	Absent	Survived
252	799007	More than 4 wks	Covid	12	12	2.3	16	212	53.1	Yes	17	5	Present	Resp Fail	SHOCK	Diaar	Present	Death
253	776508	Less than 2 wks	Covid	13	13	3.5	26	217	53.8	Yes	15	3	Present	Resp Fail	Arry	Absent	Absent	Death
254	774550	2 to 4 wks	Covid	8	10	1.8	21	205	52.5	Yes	15	4	Present	Resp Fail	Arry	Vomit	Absent	Death
255	798007	Less than 2 wks	Unknown	12	10	3.4	15	206	46.4	Yes	16	1	Present	Embol	Absent	Absent	Absent	Survived
256	998808	More than 4 wks	Covid	10	8	2.4	16	211	60.4	Yes	16	4	Present	Resp Fail	SHOCK	Absent	Absent	Death
257	588560	Less than 2 wks	Covid	10	10	2	20	166	48.8	Yes	15	4	Present	Resp Fail	SHOCK	Absent	Absent	Death
258	797804	More than 4 wks	Tuberculous	10	9	1.8	15	177	62.5	Yes	17	4	Present	Embol	SHOCK	LFT	Absent	Survived
259	776521	Less than 2 wks	Covid	13	10	2.3	20	203	48.9	Yes	17	4	Present	Resp Fail	Absent	Diaar	Absent	Death
260	775662	More than 4 wks	Covid	14	10	1.8	17	175	57.8	No	9	3	Present	Resp Fail	Arry	Absent	Present	Survived
261	776452	Less than 2 wks	Influenza	13	9	3.2	18	168	59.8	Yes	8	3	Present	Resp Fail	SHOCK	Vomit	Absent	Survived
262	774411	More than 4 wks	Klebsiella	13	12	2.2	18	174	43.4	No	8	5	Present	Embol	SHOCK	Absent	Absent	Death
263	886630	2 to 4 wks	Covid	12	11	3.4	21	214	47.8	Yes	10	5	Present	Resp Fail	Absent	Absent	Absent	Death
264	889988	2 to 4 wks	Klebsiella	12	9	2.6	17	167	58.1	Yes	17	5	Absent	Absent	SHOCK	Absent	Absent	Death
265	887700	More than 4 wks	Covid	13	12	1.8	18	183	49.6	No	8	4	Present	Resp Fail	Arry	Absent	Absent	Death
266	844120	Less than 2 wks	Covid	13	11	2.4	13	207	54.9	No	10	5	Present	Resp Fail	SHOCK	Vomit	Absent	Death
267	875209	2 to 4 wks	Covid	13	8	2	13	228	48.5	No	9	3	Present	Resp Fail	Absent	Absent	Absent	Survived
268	874102	2 to 4 wks	Covid	14	12	2.2	18	201	56.9	Yes	15	5	Present	Resp Fail	Absent	Vomit	Absent	Death
269	764310	More than 4 wks	Covid	13	10	1.8	18	168	47.9	No	8	2	Present	Resp Fail	SHOCK	Vomit	Present	Survived
270	754698	More than 4 wks	Tuberculous	12	12	2.6	23	189	60.2	No	7	4	Absent	Embol	Arry	Absent	Absent	Survived
271	720158	Less than 2 wks	Covid	12	10	1.8	16	184	48.9	Yes	16	4	Present	Resp Fail	SHOCK	Absent	Absent	Death
272	764218	2 to 4 wks	Covid	10	9	2.2	18	166	44.5	No	8	4	Absent	Resp Fail	Absent	Vomit	Absent	Death
273	754810	More than 4 wks	Covid	10	9	2.1	19	176	48.7	No	9	5	Absent	Resp Fail	Absent	Diaar	Present	Death
274	774499	Less than 2 wks	Influenza	15	12	2.1	18	165	49.8	No	8	2	Absent	Resp Fail	Absent	Absent	Absent	Survived
275	770022	2 to 4 wks	Klebsiella	12	9	2.2	19	183	50.5	No	9	2	Present	Embol	Absent	Absent	Absent	Survived
276	777777	Less than 2 wks	Covid	10	13	2	11	195	47.8	No	8	4	Absent	Resp Fail	MI	Absent	Present	Death
277	888881	2 to 4 wks	Covid	12	9	3.2	18	206	46.8	No	9	2	Present	Resp Fail	MI	Absent	Absent	Survived
278	998700	Less than 2 wks	Covid	13	10	1.9	16	166	46.1	No	9	2	Absent	Resp Fail	Absent	Absent	Absent	Survived
279	444402	More than 4 wks	Klebsiella	12	12	2.1	18	207	45.4	Yes	16	2	Present	Embol	SHOCK	Vomit	Absent	Survived
280	774455	2 to 4 wks	Covid	9	10	1.8	16	159	58.6	No	7	3	Present	Resp Fail	Absent	Absent	Absent	Survived
281	888888	Less than 2 wks	Covid	12	12	3.1	20	177	54.4	Yes	15	2	Absent	Resp Fail	Arry	Absent	Present	Survived
282	744159	More than 4 wks	Covid	10	11	1.7	23	205	52.6	Yes	15	5	Absent	Resp Fail	MI	Diaar	Absent	Death
283	999109	2 to 4 wks	Covid	12	9	2.8	20	178	42.8	Yes	15	3	Present	Resp Fail	MI	Absent	Present	Death
284	999940	More than 4 wks	Covid	13	10	2.1	19	208	45.2	Yes	16	4	Present	Resp Fail	Absent	Bleedin	Present	Death
285	665588	Less than 2 wks	Covid	12	12	3.2	21	195	47.2	Yes	16	4	Absent	Resp Fail	MI	Absent	Absent	Death
286	778201	2 to 4 wks	Covid	13	12	1.8	18	202	49	No	8	2	Present	Resp Fail	Absent	Absent	Absent	Survived
287	784502	Less than 2 wks	Covid	9	9	2.7	16	168	49.8	No	8	1	Absent	Resp Fail	Absent	Absent	Absent	Survived
288	898098	More than 4 wks	Covid	12	9	1.9	15	175	60.7	No	5	2	Absent	Resp Fail	SHOCK	Absent	Absent	Survived
289	766620	2 to 4 wks	Covid	11	11	1.9	19	198	49.6	No	9	2	Absent	Resp Fail	Absent	Absent	Present	Survived
290	773333	Less than 2 wks	Tuberculous	13	10	2.6	21	205	45.7	No	5	1	Absent	Embol	Arry	Absent	Absent	Survived
291	774411	More than 4 wks	Tuberculous	14	10	1.8	15	192	58.7	No	8	2	Present	Embol	Arry	LFT	Absent	Survived
292	723025	2 to 4 wks	Covid	9	12	2.1	18	198	54.1	No	7	2	Present	Resp Fail	Absent	Absent	Absent	Survived
293	798098	More than 4 wks	Covid	12	9	1.6	20	185	49.2	No	9	2	Absent	Resp Fail	SHOCK	LFT	Absent	Survived
294	798550	More than 4 wks	Klebsiella	12	8	1.4	18	177	54	Yes	15	5	Absent	Embol	SHOCK	Absent	Absent	Death
295	799800	More than 4 wks	Covid	12	9	2.1	21	186	52.3	No	10	3	Present	Resp Fail	Absent	Absent	Absent	Survived
296	989800	2 to 4 wks	Covid	13	9	1.9	17	172	59.5	No	8	2	Absent	Embol	Absent	Absent	Present	Survived
297	988965	Less than 2 wks	Covid	14	10	2.2	16	173	49	No	9	3	Present	Embol	Absent	Absent	Present	Survived
298	799901	More than 4 wks	Covid	10	10	2.6	18	206	47.5	No	10	4	Absent	Embol	SHOCK	Absent	Present	Death
299	797900	2 to 4 wks	Covid	9	10	2	19	176	58.4	No	9	2	Absent	Embol	Absent	Absent	Absent	Survived
300	799971	More than 4 wks	Tuberculous	12	10	2.3	18	186	50.1	Yes	16	1	Present	Embol	SHOCK	Absent	Absent	Survived

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Date 05/01/22

The Principal,
DMC, Ludhiana.

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 29.10.2021 has approved the plan of thesis of **Harmanpreet Singh Batra**, a student of your college for **MD General Medicine** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis

Etiologies, risk factors and outcome in hospitalized patients with community- acquired pneumonia.

Supervisor

Dr. Rajesh Mahajan
Prof.,
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Co-Supervisor

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The student has to submit the four copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

S P Singh

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

51. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*
52. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

ETIOLOGIES, RISK FACTORS AND OUTCOME IN HOSPITALIZED PATIENTS WITH COMMUNITY- ACQUIRED PNEUMONIA

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MD

MEDICINE

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

MARCH 2021

DR. HARMANPREET SINGH BATRA

DEPARTMENT OF MEDICINE

DAYANAND MEDICAL COLLEGE AND HOSPITAL

LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	ETIOLOGIES, RISK FACTORS AND OUTCOME IN HOSPITALIZED PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA
For the degree of	MEDICINE
Name of the candidate	HARMANPREET SINGH BATRA
Supervisor	Dr Rajesh Mahajan, Professor, Department of Medicine, DMC&H Ludhiana
Co-supervisor	Dr Akashdeep Singh, Professor & Head, Department of Pulmonary Medicine, DMC&H Ludhiana Dr Veenu Gupta, Professor & Head, Department of Microbiology, DMC&H, Ludhiana
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Community-acquired pneumonia (CAP) is frequently occurring alveolar infection and a major cause of mortality and morbidity across the globe. India counts for one -fourth of the total global pneumonia patients. There have been different outcomes related to different etiologies and different severity and patient characteristics and co-morbidities.

Aim of Study: To determine the etiology, risk factors and outcome associated in pneumonia patients.

Materials & methods: This will be observational prospective study to be conducted in the Department of Medicine, Department of Chest Medicine and intensive care unit (ICU) at Dayanand Medical College and Hospital (DMC&H), Ludhiana on patients with presumed pneumonia fitting into the inclusion criteria of the study over a period of 15 months. (1 March 2021 to 30 May 2022)

Clinical Significance: The present study will assess the etiologies, risk factors and outcome in hospitalized patients with community-acquired pneumonia which will help us understanding the functional abilities, patterns of care and health care costs and use. It will help us to know the efficacy of the pharmacological interventions being used in these patients and helping in preventing complications and having better outcome.

KEYWORDS: Community-acquired pneumonia, Etiologies, Risk factors, Outcome

(Signature) Candidate | (Signature) Co-supervisor | (Signature) Co-supervisor | (Signature) Supervisor | (Signature) Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled "**ETIOLOGIES, RISK FACTORS AND OUTCOME IN HOSPITALIZED PATIENTS WITH COMMUNITY- ACQUIRED PNEUMONIA"** exist in the Department of General Surgery, DMC&H, Ludhiana and will be provided to be candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate himself under our supervision and guidance.

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APPROVAL PROFORMA
BY RESEARCH & ETHICAL COMMITTEE
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Name of candidate	DR.HARMANPREET SINGH BATRA
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Topic of Thesis	ETIOLOGIES, RISK FACTORS AND OUTCOME IN HOSPITALIZED PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA
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Date of enrollment	30th June 2020
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Dr. Harpreet Kaur (Professor & Head, Pathology)	Mr. R K Sharma (Legal Expert)
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Approved: Yes / No

Dr. Sandeep Puri
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Approved: Yes / ~~No~~

Prof. Arvind Malhotra
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PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

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3	COURSE OF STUDY AND SUBJECT	MD MEDICINE
4	DATE OF ADMISSION OF COURSE	30th June 2020
5	TITLE OF THE TOPIC	ETIOLOGIES, RISK FACTORS AND OUTCOME IN PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Community-acquired pneumonia (CAP) is an alveolar infection that develops in the outpatient setting or within 48 hours of admission to a hospital (i.e. it is not acquired in a hospital, long-term care facility, or other recent contact with the health care system.)[1]

CAP is defined as an acute respiratory illness of:-

(A) Cough with or without expectoration, pleuritic pain, breathing difficulty

(B) Associated with at least one systemic feature such as chills and rigor, fever or malaise (body aches)

(C) With presence of new infiltrates on chest X-ray and new focal chest sign like bronchial breath sound or crackles

(D) Ruling out other acute respiratory illnesses (such as pulmonary edema, pulmonary infarction and acute respiratory distress syndrome)

(E) Not acquired in the hospital or any other health care system or it develops within 48 hours of hospital admission.[1,2]

CAP is a major cause of mortality and morbidity across the globe. India accounts for 23 per cent of global pneumonia burden with case fatality rates between 14 and 30 per cent.[2] The incidence of CAP is 4 million cases/year with 20% requiring hospitalization. The mortality rate of CAP patients in outpatient settings is 1%–5%, and in Intensive Care Unit, it is 25%.[3,4]

The etiology for CAP includes bacteria, fungi, viruses and protozoa with *Streptococcus pneumoniae* being the commonest bacterial pathogen. The pathogens can be separated into 'typical' bacterial pathogens and “non–typical” organisms. “Typical” pathogens (in decreasing order of prevalence) include Streptococcus pneumoniae, Haemophilus influenza, mycoplasma pneumoniae and Chlamydia pneumoniae. “Atypical” pathogens includes respiratory viruses (largely responsible for CAP patients requiring hospitalization).[5]

Viruses include influenza a/b, Coronavirus, rhinovirus, RSV, parainfluenza, adenovirus and coronavirus. Other agents like

Coccidioides, Histoplasma, parasitic pneumonia and blastomycosis produces pneumonia.[5]

Knowledge of different etiologies causing CAP is important and crucial for decision on selecting suitable empiric antibiotic therapy which has a major influence on the prognosis of such patients.[6] However, data about the microbiological causes of CAP in developing countries, like India, are scanty and hampered by the available data being old or limited by a small sample size and the detection methods having stayed confined to bacterial cultures.[7]

According to risk factors and epidemiological condition, the pathogen etiological agent may vary in CAP. Various risk factors increases incidence of CAP such as alcoholism, tobacco smoking, chronic obstructive pulmonary disease (COPD), hypertension, diabetes mellitus, renal failure, congestive heart failure, coronary artery disease, chronic neurological disease, and chronic liver disease.[8,9]

Radiological investigations such as chest radiographs help in differentiating CAP from other conditions rather than clinical findings, as there is very less sensitivity (58%) and specificity (67%) in the latter. In an x-ray, Tuberculosis can be suggested by upper lobe cavitations and Staphylococcus aureus infection suggested by Pneumatocele. CT is not necessary while investigating CAP, however in a patient with foreign body or tumor causing post obstructive pneumonia, it is useful modality.[6,10]

Other investigations used while investigating CAP are gram' stain, sputum culture, blood cultures, plural fluid analysis, polymerase chain reaction, urinary antigen tests.[10]

While managing CAP, it is necessary to access the severity of the disease. The severity of the disease is graded by several criteria: [as CURB-65.PSI (SCORE), PORT, A-DROP, IDSA/ ATS criteria, expanded CURB-65 and SMART COP.[11]

The following things are should be kept in mind before starting a patient on empirical treatment:

- Compliance

- Cost and safety of drug
- Pharmacokinetics and pharmacodynamics of antibiotics Interaction with other drugs

Most common organism isolated in culture[12]

Outcome of hospitalized patients are dependent on the following: length of the hospital stay, in-house mortality, ICU admission, requirement of mechanical ventilation, early/late treatment failure, and complications. Complications are pulmonary (respiratory failure, pulmonary embolism); CVS (shock, CHF, MI, arrhythmia); GIT (bleeding, vomiting, diarrhea, LFT dysfunction); and hematological dysfunction (DIC or coagulopathy).[12]

The changing trends and increasing incidence of CAP warrants the need for estimation regional incidence and prevalence of the disease with its varying etiology. Further, the clinical profile of the patients presenting with CAP is so varied that it demands a plethora of investigative setup and facilities for catering them in a holistic manner. The delay in the culture reports have led to the misuse of oral and intra venous antibiotics, that leads to the development of resistance against various antibiotics.[13] Thus it is required that every institute has an etiological profile of organisms that are commonly seen with their culture sensitivity so as to aid in the preliminary administration of antibiotics.

Thus, the present study was conducted to determine the etiology and clinical profile of patients presenting with community acquired pneumonia at our institute. The knowledge of the baseline demographic and clinical profile of the patients shall help in knowing the various risk factors and its implication on the outcome.

This study will also help in creating public awareness about this disease to facilitate early detection and effective management.

6.2 REVIEW OF LITERATURE

Worldwide, community-acquired pneumonia (CAP), which is a frequently occurring as well as deadly infection, considerably has implications on the health care systems. Generally, poor outcomes are reported to be associated with different etiologies, different severity, patient characteristics, and comorbidities.[14]

For the management of CAP, in spite of the existing standard guidelines as well as several options of available antibiotics, there is a high burden of morbidity and mortality of CAP. This may be due to many factors. In India, these include failure of empirical therapy, possibly due to the inadequate microbial coverage; increase in bacterial resistance; and adverse effects of existing treatments, causes the ineffective treatment of CAP.[12]The knowledge of the etiology and clinical profile of the patients of CAP becomes important for a better diagnosis and management of the patients.

Fine MJ et al, (1999) in a study including 944 patient on outpatient basis and 1,343 inpatients found that cough and fatigue were present in most of the patients and 23% of the patients had tachypnea (respiratory rate >30) while 13% had tachycardia (heart rate > 125 bpm) and 17.3% had altered mental status. Chest X-rays revealed that pulmonary infiltrates and pleural effusions were present in 84.3% and 3.3% of patients, respectively. Lab investigations showed that abnormal values with increased WBC and low albumin levels in majority of the patients. Most frequently isolated organisms were Streptococcus pneumoniae and *Haemophilius influenza*. Median length of stay for inpatients was 8 days. Mechanical ventilation was required in 0.05% patients. Outcome of the study was assessed at the end of the 30 day from the day of admission. 107 inpatients died within 30 days; of which 81 deaths were related to CAP; immediate cause of death were respiratory failure (42.5%), cardaic arrhythmia (8, and sepsis (5.3%). Results showed that pneumonia occurred in mostly in patients with underlying comorbid illness.[15]

Kothe et al, (2008) in a multicenter prospective study including 2,647 patients with CAP found that the overall 30-day mortality rate was

6.3%. Elderly patients showed a significantly higher mortality rate independently associated with age; residence; confusion, urea, respiratory frequency and blood pressure (CURB) score; comorbid conditions; and failure of initial therapy. In the elderly, advancing age was the predictive of death. There was a 4-fold increased mortality rate in the nursing home residents showed as well as an enhanced rate of gram-negative bacillary infections than the patients community dwellers. The CURB score and cerebrovascular disease were as independent predictors of death. After controlling for comorbid conditions and disease severity, AGE and residence status were independent risk factors for mortality. The only modifiable prognostic factor was the failure of initial therapy.[16]

Torres et al, (2013) in a literature review including studies on CAP patients found that incidence of CAP was higher among men compared to women and in patients who had HIV infection or chronic respiratory disease. The lifestyle factors that were found to be associated with enhanced risk of CAP were smoking, alcohol intake, underweight, regular contact with children, and poor dental hygiene. Comorbid conditions such as cerebrovascular disease, epilepsy, chronic respiratory and cardiovascular diseases, dementia, Parkinson disease, dysphagia, HIV, or chronic renal or liver disease increased the risk of CAP by 2-fold to 4-fold. Results showed that lifestyle factors as well as underlying comorbidities were associated with an enhanced risk of CAP.[17]

Di Yacovo S et al, (2013) in an observational analysis of a prospective cohort including 2407 patients with CAP found that 21.4% occurred in patients with diabetes mellitus; 97% patients had type 2 diabetes. Patients with diabetes mellitus had different clinical features than other patients, with less acute onset, cough, purulent sputum, and pleural chest pain. Etiology was similar in study groups. Patients who had diabetes melliteus (DM) had more in-hospital acute metabolic complications, although the case-fatality rate was comparable between patients with and without diabetes mellitus (DM). Independent risk factors for mortality in DM group were advanced age, bacteremia,

septic shock, and gram-negative pneumonia. Results showed that CAP in patients with DM had different clinical features than features of patients without DM.[18]

Jain SK et al, (2014) in a study including 140 patients with community-acquired pneumonia found that microbiological diagnosis using sputum and blood in CAP was seen only in 45.5% patients. Sputum isolated organism in 44 patients while blood in 11 patients. Streptococcus pneumoniae was most common isolated organism (in 36.4% patients), followed by Klebsiella pneumoniae in 29% patients, Staphylococcus aureus in 20% patients, and other Gram-negatives bacilli in 14.5% patients (Haemophilus influenzae 5.5%, Pseudomonas 1.8%, Acinetobacter 1.8%, Enterobacter 1.8%, Escherichia coli 1.8%, Citrobacter 1.8%). Males (67.5%) and elderly age group (68.3%) were predominately affected. Cough and fever were the most common presenting complaint in 92.5% and 90% patients, respectively, while dyspnea was seen in 59.2% of the patients, expectoration in 55% and pleuritic chest pain in 14.2%. Amongst the predisposing risk factor associated, smoking and COPD were common seen in 40.8% and 35.8% of the patients respectively. In x-ray, most common finding was lobar pneumonia commonly seen in right lower lobe consolidation (48.3%) patients, followed by left lower lobe infiltration ($P < 0.0001$).[19]

Elshamly et al, (2016) in a study including 54 in-patients with severe community-acquired pneumonia (SCAP) found that hypertension and Diabetes mellitus were common comorbidities present in patients. Fever was the most common symptom (85.7%), followed by breathing difficulty, dyspnea, and cough. The most frequently identified organism included Streptococcus pneumoniae, H1N1 influenza, and S. aureus. Patients with comorbidities had low hemoglobin levels, high neutrophil counts, increased blood creatinine and urea levels; in arterial blood gas, low pH, high PaCO2 and low PaO2 was noted. Chest radiograph showed bilateral infiltrates in 35.1% patients (commonly in Streptococcus pneumoniae, H1N1 influenza, and S. aureus.). Complications associated were septic shock and renal failure. Outcome were: 42.9% patients with comorbidities needed mechanical

ventilation and 21.4% required non-invasive ventilation while 23.1% of those without comorbidities needed mechanical ventilation and 19.2% needed non-invasive ventilation. Hospital stay was longer in patients with comorbidities.[20]

Ito A et al, (2017) in a retrospective study including 1834 patients with CAP reported that mean age of patients was 73.5 years. Men(69.8%) were affected more. The most common organism isolated were Streptococcus pneumoniae(22.2%) and *Haemophilus influenza* (7%) Amongst the comorbidities assessed, chronic heart disease (30.2%) was most common. It was observed that 30 day mortality was 6.7% while signs and lab investigations including hypothermia, tachypnea, Pao2/Fio2 ≤ 250 mm Hg, high BUN, and low albumin level. Mechanical ventilation had worse prognosis to the outcome. These lab parameters and mechanical ventilation were predictive factors for ICU admission. Azithromycin and Beta- lactam when in combination significantly reduced the 30- day mortality. Results showed that all severity scores for pneumonia, CURB-65, PSI, IDSA/ATS, Severe pneumonia criteria, and A-DROP are useful in predicting the prognosis and severity of the disease and helps in recognizing which patient requires immediate treatment and ICU care.[21]

Para et al, (2018) in a study included 225 patients with CAP of 18 to 93 years age (median 59 years); CAP was more prevalent in males (52.9%). hypertension (92 patients), COPD (84 patients), diabetes (36 patients), chronic kidney disease (27 patients), heart failure (24 patients), and chronic liver disease (3 patients) were common comorbidities associated with CAP. *S. Pneumoniae* was the most common pathogen isolated in 30.5% of patients, followed by *L. Pneumophila in* 17.5%, and influenza viruses in 15.4% patients, and about 4% of patients had multiple pathogens. The patients presented with symptoms consisting in cough (89.8%), fever (86.2%), breathlessness (69.3%), chest pain (17.8%), and altered sensorium (19.1%). 33.8% had cyanosis and 8% had hypotension at presentation. Chest radiography revealed bilateral lung involvement in 12 (5.3%). The most common finding was consolidation (48%) followed by

interstitial infiltrates in (41% patients. 10.6% were admitted in ICU. At the time of admission, typical pathogens had higher CURB-65 score with more bilateral radiographic involvement, and undergone adverse outcomes such as septic shock and use for mechanical ventilation while atypical agents in comparison had milder episodes.[7]

Lin CJ et al, (2020) in a retrospective cross-sectional study including 598 patients with CAP (men: 236) found that 33.28% patients were hospitalized. Factors that significantly increased the risk of hospitalization for CAP included the use of nasogastric tube (OR, 3.01; 95% CI 1.88 to 4.82), anemia (OR, 2.37; 95% CI, 1.48 to 3.80), male sex (OR, 2.14; 95% CI 1.43 to 3.20), chronic respiratory disease (OR, 2.09; 95% CI 1.33 to 3.30), dementia (OR, 1.94; 95% CI 1.2 to 2.97), heart failure (OR, 1.69; 95% CI 1.11 to 2.56), and hypoalbuminemia (OR, 1.57; 95% CI 1.03 to 2.40).[22]

Shoar et al, (2020) in a systematic review including 146 articles with 82,674 CAP patients found that most common cause of CAP was Pneumococcus (33-50% of the cases). The second most common cause was *Haemophilus influenzae* (7-16% of cases), followed by *Staphylococcus aureus* and *Enterobacteriaceae* each in 4–10%. A virus was identified in 30% to 40% of patients, and bacterial/viral coinfection in 25% to 35% of these cases. Influenza viruses were identified in 6.2% to 13.7% of cases and rhinoviruses in 4.1% to 11.5% cases. RSV and human metapneumovirus were less common (0.4% to 4.7%). There was no etiologic agent for CAP in more than 50% patients.[23]

There have been various studies conducted in order to describe the community acquired pneumonia in different population group, but whether these inferences hold good for our population is a pertinent question. In view to this, we need to study the clinical profile of such patients, accessing its various risk factors and the changes in the etiologies with regards to its implication on the outcome in our setting .By the mode of this study we will help in early detection of disease admitted in state of Punjab.

6.3 AIMS AND OBJECTIVES OF THE STUDY

To determine the etiology, risk factors and outcome associated in pneumonia patients.

7.0 MATERIALS AND METHODS

This study will be conducted at Dayanand Medical College and Hospital, Ludhiana on patients with presumed pneumonia; presenting with symptoms of acute respiratory infection in the emergency department, medicine ward and intensive care unit(ICU).

7.1 SOURCE OF DATA

This will be observational prospective study to be conducted on all patient presenting with complaints of fever, cough, chest pain and breathing difficulty; fitting into the inclusion criteria of the study in the department of medical emergency of DMCH, Ludhiana over a period of 1 and half years.

7.2 METHOD OF COLLECTION OF DATA

All patients presenting with signs and symptoms of pneumonia and willing to participate in the study after giving informed consent will be included in the study.

A thorough demographic history and clinical history will be obtained in the pre-designed study proforma. The clinical examination shall be done at the time of presentation and investigations which are part of evaluation like hemogram, metabolic profile, chest X-ray, radio-imaging, etc. shall be done. Outcome of the patient will be assessed at the time of discharge

Inclusion Criterion:

1. Age more than 18 years
2. Patients/ attendants agreeing to participate in the study after signing informed consent
3. 2 or more than 2 symptoms (fever, cough , chest pain and breathing difficulty)
4. Presence of new infiltrates on radio-imaging

Exclusion Criterion:

1. Consent not available
2. Age < 18 years
3. Patients having hospital acquired pneumonia(HAP)
4. Ongoing treatment for malignancy
5. Use of immunosuppressive medication.

METHODOLOGY: A written informed consent will be obtained from the patients who will satisfy the eligibility criteria. After enrollment into the study, Clinical history will be obtained.

Detailed clinical examination will be done. After clinical history, patients will be subjected to routine laboratory investigations which includes CBC, LFT, RFT including electrolytes, uric acid, Blood sugar, C-reactive protein (CRP), Arterial blood gases (ABG), chest X-ray and blood culture sensitivity. Wherever indicated special investigations in the form of sputum analysis, anti-SARS-CoV-2 antibodies Nasopharyngeal swabs (for PCR testing to detect H1N1 and SARS-Cov2), pleural fluid analysis, Galacatomann, (1,3) – BETA- D- Glucan (Fungitell), Procalcitonin, CECT chest and bronchoscopy will be done.

Duration of Study: 15 months (1 March 2021 to 30 May 2022).

Outcome: The patients will be followed during the course of hospital and will be assessed as per the duration of hospital stay; ICU admission; need of mechanical ventilation and any complications related to the disease process

Statistical Analysis:

Data will be described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

No.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Yes

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PROFORMA

SR. NO

PATIENT'S NAME: AGE: SEX:

ADDRESS:

MRD NO.:

DATE OF ADMISSION_____ DATE OF DISCHARGE_____

1. PRESENT ILLNESS:

FEVER/COUGH /EXPECTORATION /CHEST PAIN/BREATHING DIFFICULTIES /OTHER (ABDOMINAL COMPLAINTS)

DURATION OF ILLNESS_____

2. PAST HISTORY:
    - COPD / BRONCHIAL ASTHMA/ CHRONIC BRONCHITIS
    - HYPERTENSION
    - CAD
    - CVA
    - CANCER
    - CONGESTIVE HEART FAILURE
    - LIVER DYSFUNCTION
    - RENAL DYSFUNCTION
    - HIV
    - LUNG CARCINOMA
3. FAMILY HISTORY
4. PERSONAL HISTORY – ALCOHOL/SMOKING/SUBSTANCE ABUSE
5. USE OF CHRONIC STEROIDS – Y/N AND DURATION _____
6. OCCUPATION
7. **GENERAL PHYSICAL EXAMINATION**:

BUILT: WEIGHT- PULSE:

BLOOD PRESSURE: TEMPERATURE:

RESPIRATORY RATE:

PALLOR / PEDAL EDEMA / CYANOSIS / JVP / CLUBBING

Signature of Candidate **Signature of Supervisor**

8. **SYSTEMIC EXAMINATION:**

RESPIRATORY SYSTEM:

CARDIOVASCULAR SYSTEM:

ABDOMEN:

CENTRAL NERVOUS SYSTEM:

LABORATORY INVESTIGATIONS

INVESTIGATIONS

HB(g/dl) _____ TLC(/mm^3) _____ DLC _____ RBS (mg/dl)_____ CREATININE(mg/dl)_____ S.UREA(mg/dl) _____ SGOT(u/l)_____ SGPT(u/l) _____ ALBUMIN(g/dl) _____ CRP(mg/dl) ____ S.SODIUM (meq/dl) ____ S .POTASSIUM (meq/dl) ____

CHEST X-RAY :

ANTI-SARS-COV-2 ANTIBODIES (IF INDICATED) –

CECT CHEST (IF INDICATED) –

ECG –

2D – ECHO (IF INDICATED)-

MICROBIOLOGICAL

- BLOOD C/S
- SPUTUM EXAMINATION – GRAM STAIN, C/S, AFB/ NOCARDIA, FUNGAL, CBNAAT
- NASOPHARYNGEAL SWAB FOR RT-PCR – H1N1 AND SARS COV-2

Signature of Candidate **Signature of Supervisor**

- PLEURAL FLUID ANALYSIS – CULTURE AND MICROSCOPY (IF INDICATED)
- TTNA (IMAGE GUIDED) (IF INDICATED)
- BAL (IF INDICATED)
- GALACATOMANN /(1,3) – BETA- D- GLUCAN (FUNGITELL)/ PROCALCITONIN (IF INDICATED)

ETIOLOGICAL ORGANISM ISOLATED -

TREATMENT GIVEN -

DRUG	DOSE	DURATION

OUTCOME

- DISCHARGE / DEATH / LAMA
- LENGTH OF THE HOSPITAL STAY
- ICU ADMISSION – Y/N
- NEED OF INOTROPES – Y/N
- REQUIREMENT OF MECHANICAL VENTILATION – Y/N
- COMPLICATIONS - Y/N
    - PULMONARY (RESPIRATORY FAILURE ,PULMONARY EMBOLISM)
    - CVS (SHOCK, CHF, MI , ARRHYTHMIA)
    - GIT (BLEEDING , VOMITING , DIARRHEA , LFT DYSFUNCTION)
    - HAEMATOLOGICAL DYSFUNCTION (DIC OR COAGULOPATHY)

FINAL DIAGNOSIS -

Signature of Candidate **Signature of Supervisor**

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....
.....am willing to participate in the study. I am ready to participate in this study on my own **"ETIOLOGIES, RISK FACTORS AND OUTCOME IN HOSPITALIZED PATIENTS WITH COMMUNITY- ACQUIRED PNEUMONIA"** I affirm that I have not been given any financial incentive and no pressure has been put on me to give the consent. The purpose of this research has been explained to me and I believe that it is for the benefit of science and mankind. I have been explained about the risk in this research and I understand that the risk is very minimal. I have been explained the method of participating in this research work.

I can choose to opt out of this research at any time and my opting out will not have any effect on my treatment.

.....
Signature of the Witness

.....
Signature of the patient

Name:

Signature of Candidate

Signature of Supervisor

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य "ETIOLOGIES, RISK FACTORS AND OUTCOME IN HOSPITALIZED PATIENTS WITH COMMUNITY- ACQUIRED PNEUMONIA" में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____

गवाह के हस्ताक्षर

नाम:

_____

रोगी के हस्ताक्षर/अंगूठे का निशान

नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"ETIOLOGIES, RISK FACTORS AND OUTCOME IN HOSPITALIZED PATIENTS WITH COMMUNITY- ACQUIRED PNEUMONIA" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____
ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____
ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____
ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____
ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ